VEGETATION OF THE WESTERN PORT CATCHMENT

by

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ABSTRACT

The catchment of Western Port, Victoria, was surveyed between January 1980 and September 1981, using a floristics-based, quadrat-sampling technique. The data from the 656 quadrat sites of this survey plus 362 quadrats from surveys carried out by others (between 1972 and 1979) were analysed using a computer-based, numerical sorting and classification procedure to determine the major, floristic vegetation types of the area. These were then arranged, hierarchically, into 19 floristic *communities*, each of which contained one or more distinct floristic *sub-communities*.

Communities defined in this paper range from wet mountain forests and sclerophyll woodlands in the north-east of the catchment, through open grassy woodlands and heathlands in the central regions, to sclerophyll woodlands, heathlands, swamps and grasslands near the coast.

INTRODUCTION

This paper presents the results of surveys of the vegetation of the Western Port catchment, Victoria. Its purpose is to define the major floristic vegetation types of the study area and give an indication of their distribution and environmental ranges. The results incorporate data from 656 quadrat sites examined in 1980–81 by a team from the National Herbarium of Victoria and from 362 quadrats surveyed by others between 1972 and 1979.

THE STUDY AREA

The study area is defined as the Western Port catchment plus the southern portion of Phillip Island (Figs 1 and 2). The major streams flowing into Western Port are, from west to east, Cardinia Creek, Toomuc Creek, and the Bunyip, Tarago, Lang Lang and Bass Rivers.

The catchment is approximately 3,300 square km in area and ranges in altitude from sea level to 898 m at Spion Kopje (Fig. 3). Median annual rainfall ranges from below 800 mm on French and Phillip Islands to above 1400 mm in the north east (Fig. 4). Most of the native vegetation in the catchment is on crown land controlled by the Department of Crown Lands and Survey, the Victorian Forests Commission or the Fisheries and Wildlife Division of the Victorian Ministry for Conservation.† The areas devoid of native

Fig. 1. Location of the study area in Victoria. The stippled area represents the Western Port catchment.

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†Due to departmental amalgamations on 1 November 1983, this crown land is now controlled by the Department of Conservation, Forests and Lands.

Muelleria 5(5): 289-346 (1984).

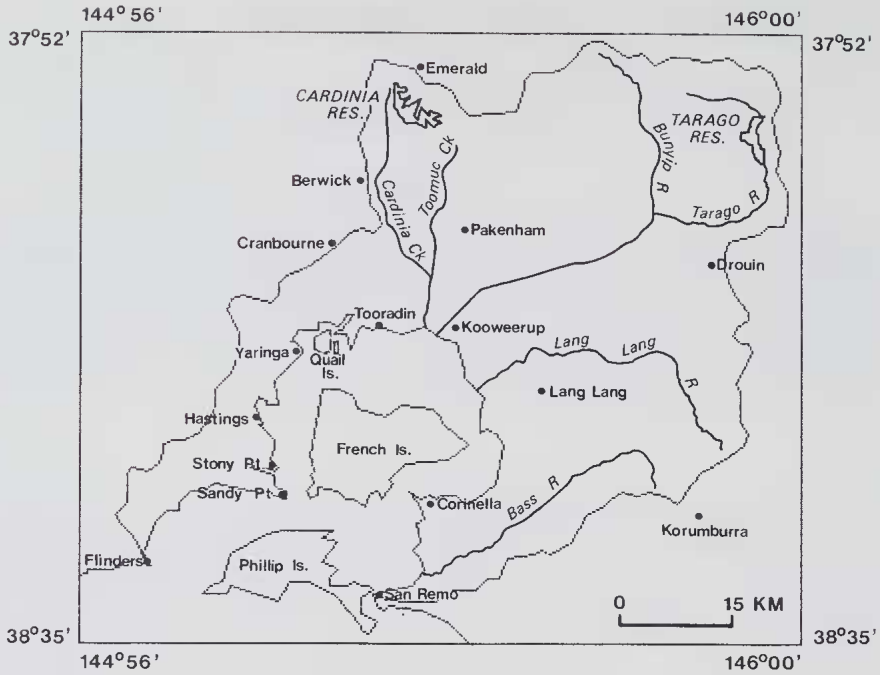

Fig. 2. The boundary of the study area and the major islands, towns, reservoirs and rivers within it. The base map used in this figure (excluding the rivers and place names) is computer-generated and schematic only.

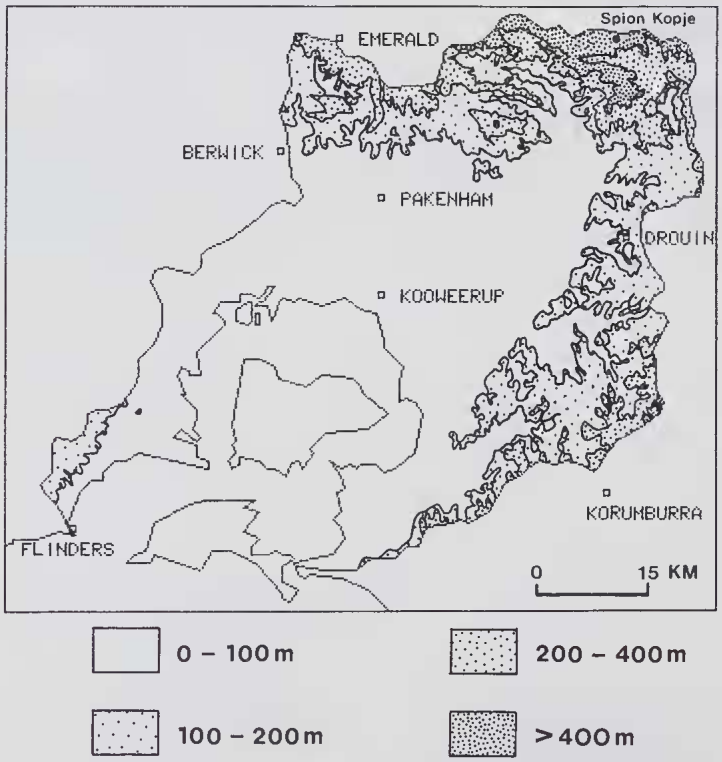

Fig. 3. Topography of the study area. Different density stippling represents different altitude ranges.

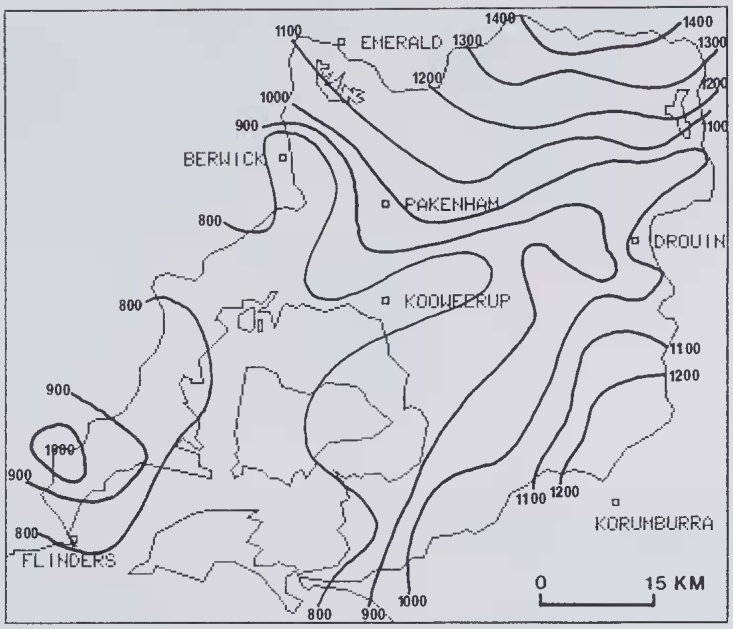

Fig. 4. Median annual rainfall (in mm) of the study area, after Shapiro (1975).

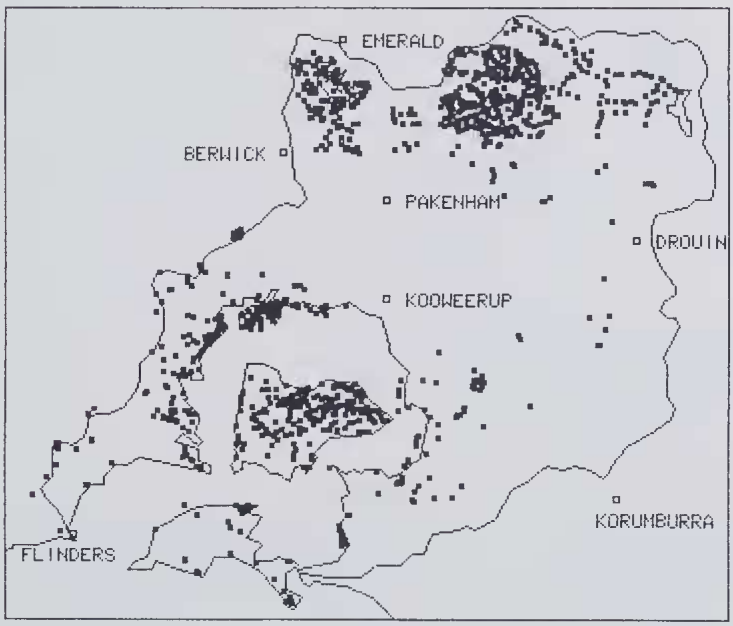

Fig. 5. Localities of all quadrat sites in the catchment.

vegetation are predominately privately owned and utilised for agriculture. The distribution of sample sites (quadrats) throughout the study area (Fig. 5) indicates the density and distribution of the existing native vegetation in the catchment. The most densely vegetated areas are found in the north of the catchment in the Black Snake and Blue Ranges and south of Emerald, and on French and Phillip Islands. Remnant areas of native vegetation occur throughout the Mornington Peninsula in the west of the catchment. In the hills to the east of the study area the forests have been cleared completely. In the central lowlands the Koo-Wee-Rup Swamp has been drained and converted to pasture land so that almost no native plant species remain except on a few roadside verges.

THE SURVEY

Method

Field Work

The sampling procedure for the 1980–81 survey utilised the one kilometre square grid of the Australian National Mapping System. Within each square substantially covered by native vegetation two quadrats (or only one if the square was less than half covered by native vegetation) were chosen so that they represented a range of visibly different habitats (e.g. river, swamp, hillside, ridge). Each site sampled constituted a single uniform stand of vegetation and covered an area of approximately 1000 square metres. Every vascular plant species within a quadrat was identified and assigned a cover/abundance value (Gullan 1978) corresponding to a visual estimate of its performance in that quadrat. A total of 656 quadrats was sampled in this way.

All the suitable botanical information available for the study area from other sources was also collated. These additional data sources were Gullan *et al.* (1979), Gullan (1978), Wellington *et al.* (1977), Grant (1974) and Calder (1972). The basic method of floristic data collection was the same for these previous surveys as the method described above with the exception of the area of the quadrats used. This was either 25, 90 or 1000 square metres. Data from these sources comprised an additional 362 quadrats.

Plant Identification

For the 1980–81 survey all plants which could not be identified in the field were collected, labelled and taken to the National Herbarium for closer examination and comparison with the Herbarium's reference collection. This procedure allowed for the identification, to species level, of all but a few plants collected. Nevertheless a number of qualifications must be made concerning the nomenclature used in this paper. As far as possible all nomenclature follows that of Willis (1970, 1973) with amendments by Todd (1979, 1981). However, due to the difficulty in distinguishing between certain closely related groups of species, particularly those for which vegetative parts only could be found, some names should be taken to mean one of two or more species. For example:

Amyema pendulum, A. miquelii — all have been recorded as *A. pendulum* except where flowering material indicated otherwise.

Casuarina paludosa, C. pusilla — no distinction was made between these closely related species on the mainland and all were recorded as *C. paludosa*. On French Island two distinct taxa were apparent. A glabrous form was recorded as *C. pusilla* and a pubescent form as *C. paludosa*.

Caustis pentandra, C. restiacea — a few definite specimens of *C. restiacea* have been collected but, as *C. pentandra* sometimes has fine culms and *C. restiacea* has not been recorded from the area previously, it is likely that *C. restiacea* is more abundant than is indicated by this survey.

Centaurium pulchellum, C. minus — distinction between these species is made difficult by the broad overlap in distinguishing characteristics. Absence of flowering material increases this difficulty. If there was any doubt the species was recorded as *C. pulchellum*.

Danthonia pilosa, D. racemosa — although most specimens were easily referable to one or other of these species, some intergradation was apparent.

Drosera auriculata, D. peltata — differentiation between these species was difficult in the absence of flowering material.

Eucalyptus dives, E. radiata — intergradation between these species made them sometimes difficult to distinguish.

Filmy ferns *(Hymenophyllum* spp., *Mecodium* spp. and *Polyphlebium venosum)* have a cryptic habit and some species may have been overlooked.

Hypolepis spp. — differentiation between the four species of this group was difficult and it is possible that the wrong name has been applied on occasions.

Juncus spp. — species of the section Genuini were identified where possible but some difficulties were encountered and all have been recorded as *Juncus* spp. for the purposes of this paper.

Lagenifera stipitata, L. gracilis — vegetative states are very similar. All have been recorded as *L. stipitata* except where reproductive material has indicated otherwise.

Lepidosperma filiforme, L. semiteres — although most specimens were easily referable to one or the other species some intergradation was apparent.

Leptospermum lanigerum, L. glabrescens — in some areas, particularly along rivers, differentiation between these two species was difficult and it is possible that, on some occasions, the wrong name has been applied.

Luzula campestris sp. agg. — no attempt has been made to distinguish between the species of this group described by Nordenskiold (1969) and Edgar (1975).

Poa australis sp. agg. — no attempt has been made to distinguish between the species of this group described by Vickery (1970).

Rubus fruticosus sp. agg. — no attempt has been made to distinguish between the members of this group described by Amor and Miles (1974).

Stipa hemipogon, S. semibarbata — although usually easy to distinguish, even in the field with a hand lens, mistakes may have been made or one species may have been overlooked at some sites.

Stipa pubescens — an unusual form of this species was encountered on French Island. Later taxonomic work may show this to be a new species.

Tmesipteris ovata, T. parva — due to the similarity of these species it is possible that on some occasions the wrong name has been applied.

Grant (1974) recorded *Leucopogon collinus* on French Island. However, this species is commonly restricted to the near-coastal heaths of Gippsland. Unfortunately no specimens could be located to verify the identification. For the purposes of this paper these records are assumed to refer to either *Leucopogon australis* or *Leucopogon parviflorus*.

Data Storage and Analysis

Information from each quadrat site (floristics, locality, altitude and sampling data) was stored permanently on magnetic disc. Analyses were in the form of a computer-based, numerical classification procedure coupled with a hand-sorting procedure of the type outlined in Gullan (1978). The final result of this analysis is a two-way table which holds all of the raw data in a sorted form. However, because most species occur in less than 10% of the quadrats and add little to the overall vegetation description, the two-way tables presented in this paper do not contain all the species

recorded in each quadrat. For a full explanation of the two-way tables see Gullan *et al.* (1981).

Terminology

The terminology associated with the vegetation classification follows that of Gullan *et al.* (1981). These terms are discussed briefly here.

Sub-Community

A sub-community is a group of quadrats which have a similar floristic composition.

Community

A community is a collection of one or more sub-communities which have floristic and environmental affinities. The community may represent a floristic continuum along which arbitrary divisions have been made to form sub-communities. It may represent a collection of sub-communities which are considered to be different temporal phases of the same vegetation or vegetation under different disturbance regimes (e.g. fire, grazing, clearing).

Character Species

A character species is one which occurs frequently and consistently in the quadrats of a sub-community and is useful as an indicator of that sub-community. For a fuller discussion of this term and its numerical calculation see Gullan *et al.* (1981).

Community Names

These are familiar and descriptive names (common names) applied to the communities and take into account common, although often imprecise, terminology (e.g. Wet Sclerophyll Forest). The naming system used here is described more fully in Gullan *et al.* (1981). Where appropriate the names of communities in this paper follow those of Gullan *et al.* (1981) and Forbes *et al.* (1982).

Limitations and Qualifications

Floristics

As each quadrat was sampled only once some annual and ephemeral species may have been missed at quadrat sites.

Distribution of Sub-communities

The distribution maps provided with the sub-community descriptions show sites where a sub-community has been positively recorded. They are not exhaustive maps of each sub-community.

Weeds

The mean weed composition of each sub-community has been determined in this paper. This is an indicator of weed invasion into native plant communities. It should not be interpreted as an indicator of the abundance of weeds in the entire study area.

RESULTS

The results of the survey and its analysis are presented in three different ways in order to provide easy access to any piece of information relevant to the aims of this paper.

Two-way Tables

The two-way tables (Tables 1–14) contain a succinct description of the floristic composition of the vegetation and are the most important source of information on floristic variation within and between different kinds of vegetation (see Gullan *et al.*, 1981).

Community Descriptions

Nineteen communities have been described for the Western Port catchment. One community, a woodland with a grassy understorey, has been severely reduced in area since European settlement. It is considered that no unaltered representatives of this community exist in the study area and that one or more sub-communities have become extinct since settlement. An entire community, which was represented by a vast swampland north of Koo-Wee-Rup, has become extinct since European settlement. Very little is known of its floristic composition.

Forty-three of the 1018 quadrats sampled in the survey did not fit into the vegetation classification and consequently have not been assigned to a community. These quadrats invariably represent sites that have been grossly disturbed in the past.

A brief description of each of the communities is given below.

WPC Community 1: Cool Temperate Rainforest (Fig. 6a).
(1 sub-community; 9 sites).

An open to closed-forest found in the wettest gullies in the north-east of the study area. This community occupies only narrow strips along water courses and the major tree, *Nothofagus cunninghamii*, is seldom greater than 15 m in height or 1 m in girth. This suggests that the study area provides only marginal habitat for Cool Temperate Rainforest.

WPC Community 2: Wet Sclerophyll Forest (Fig. 6b).
(5 sub-communities; 109 sites).

Tall open-forest mainly found on kraznozem soils in the hilly country of the north-east between 100 and 750 m. The major tree species is usually *Eucalyptus regnans* but *E. viminalis, E. obliqua* and *E. cypellocarpa* are also common. The understorey is usually characterised by tall, broad-leafed shrubs and tree ferns.

WPC Community 3: Riparian Forest (Fig. 6c).
(3 sub-communities; 57 sites).

An open-forest which borders, and in some cases extends into, the rivers and creeks of the foothills (between 50 m and 250 m) to the north and east of the Western Port catchment. This community is usually floristically rich and varied and often supports agricultural weeds. The principal tree species of Riparian Forest in the Western Port catchment is *E. ovata*.

WPC Community 4: Dry Sclerophyll Forest (Fig. 6d).
(1 sub-community; 11 sites).

An open-forest, scattered in the central part of the study area, on shallow, rocky soils of sloping ground between 100 m and 200 m. Trees are usually *E. obliqua, E. radiata* and *E. globoidea* (near its western limit). The understorey is usually very open and is dominated by grasses and herbs. Large boulders are a feature of the landscape.

WPC Community 5: Damp Sclerophyll Forest (Fig. 6e).
(9 sub-communities; 141 sites).

An open-forest to low open-forest found on loamy soils throughout the study area between 10 m and 500 m. The tree layer is varied and usually supports stringybarks *(E. obliqua, E. baxteri, E. sieberi)*, peppermints *(E. radiata)*, and gums *(E. cypellocarpa)*. The understorey varies in floristic composition and richness but is usually dominated by sclerophyllous shrubs, many of which are legumes, (e.g. *Acacia* spp., *Pultenaea* spp., *Spyridium parvifolium, Platylobium formosum)*, and almost invariably contains wire grass *(Tetrarrhena juncea)* and bracken *(Pteridium esculentum)*.

WPC Community 6: Wet Heathland (Fig. 6f).
(3 sub-communities; 29 sites).

A closed-heath to woodland found on seasonally waterlogged soils in the north of the study area between 50 m and 200 m. The vegetation supports a wide range of sedges, lilies and sclerophyllous shrubs; the latter are mostly representative of the

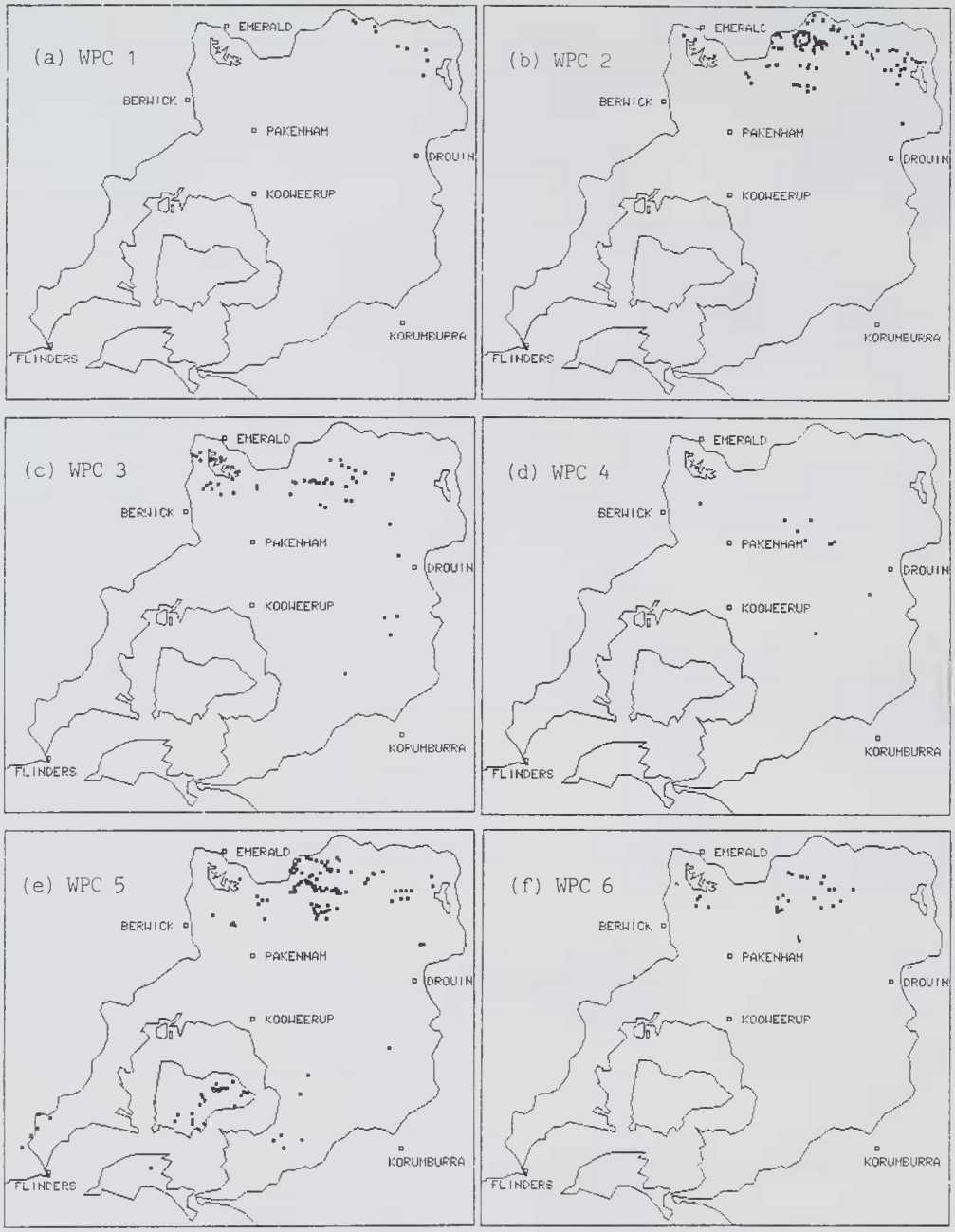

Fig. 6. Distribution maps for communities 1–6. Black squares represent quadrats. Open squares represent major towns.

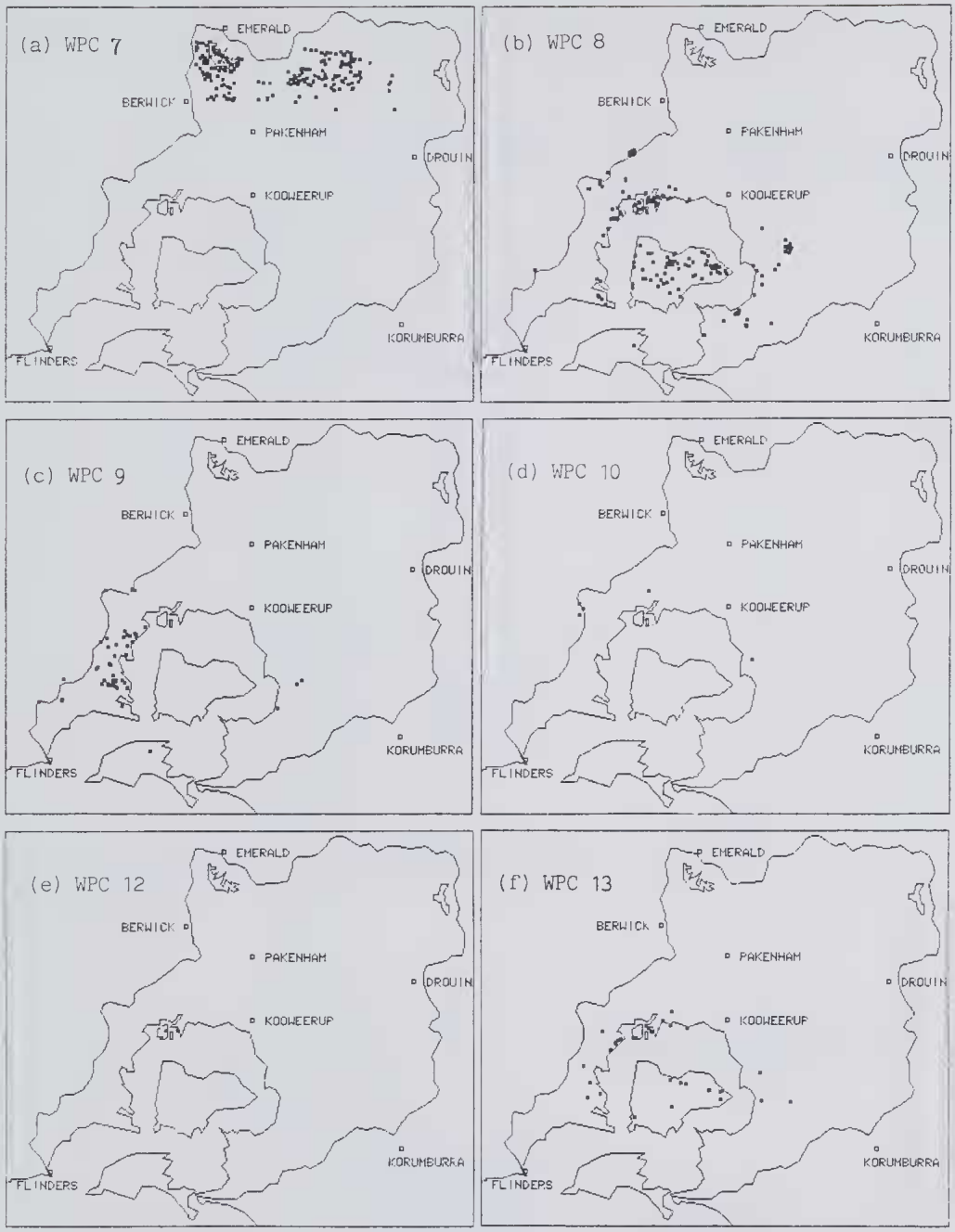

Fig. 7. Distribution maps for Communities 7–13. Black squares represent quadrats. Open squares represent major towns.

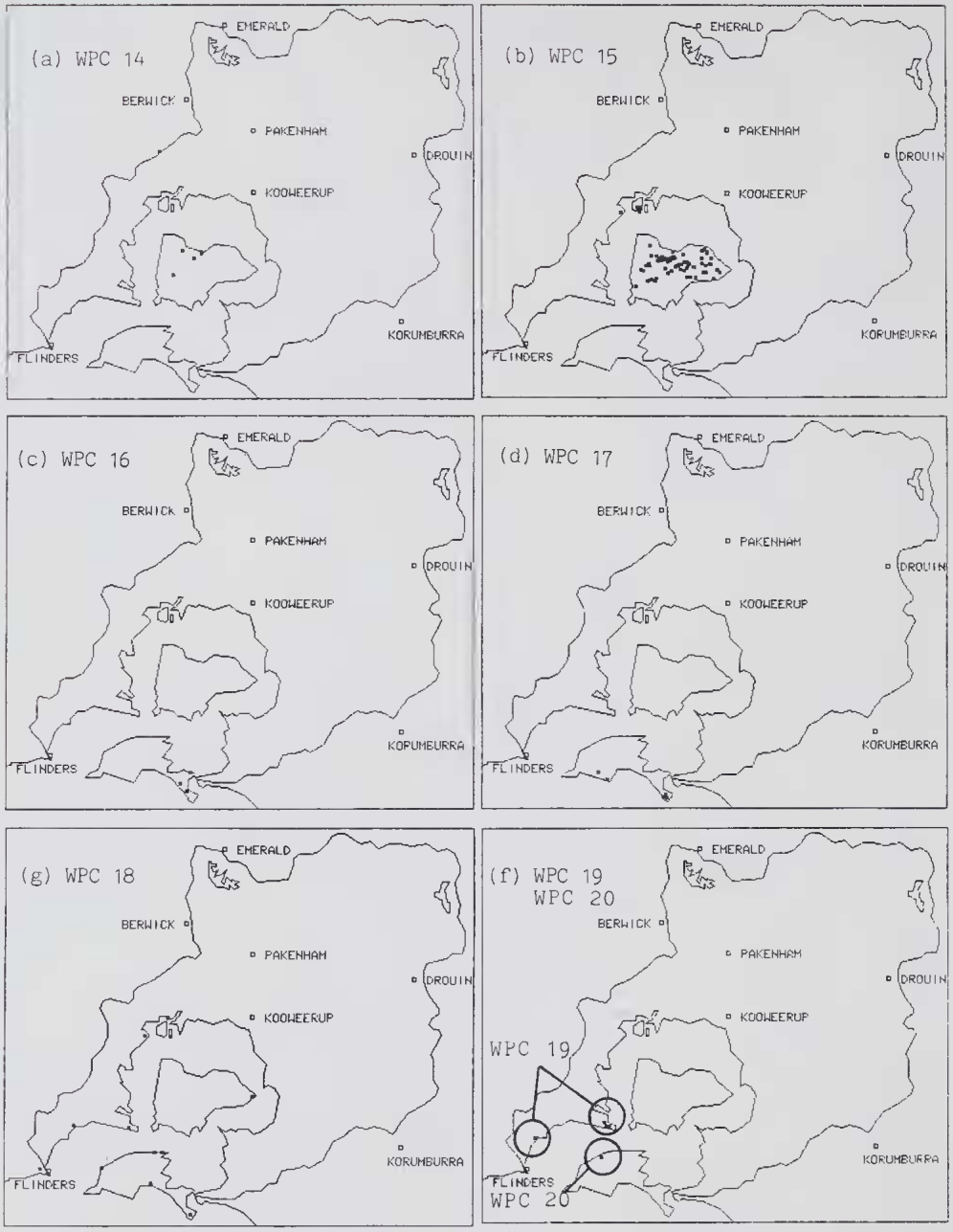

Fig. 8. Distribution maps for Communities 14–20. Black squares represent quadrats. Open squares represent major towns.

families Proteaceae, Epacridaceae and Myrtaceae. Trees are never common in the Wet Heathland but when present they are usually *E. cephalocarpa*.

WPC Community 7: Sclerophyll Woodland (Fig. 7a).
(5 sub-communities; 183 sites).

A woodland to low open-forest found on gravelly clays in the north-west and north-central parts of the study area between 40 m and 400 m. The trees are usually small with very short trunks. *(E. goniocalyx, E. cephalocarpa, E. radiata, E. dives, E. sieberi, E. obliqua)*. The understorey is floristically rich and is characterised by an abundance of grasses (particularly *Stipa muelleri* and/or *Themeda australis)*, tussock-forming sedges, *Banksia* spp. and *Hakea* spp.

WPC Community 8: *Leptospermum myrsinoides* Heathland (Fig. 7b).
(6 sub-communities; 201 sites)

A closed-heath to woodland found on podzols of near-coastal regions of Western Port and French Island between 5 m and 90 m. Trees are common but seldom dominant in this community with usually one chief species. To the north-east and west of Western Port *E. viminalis* is the main tree species, on French Island it is *E. obliqua* and to the east it is *E. radiata*. The understorey is dominated by *Leptospermum myrsinoides* and a range of smaller, sclerophyllous shrubs mainly of the families Myrtaceae, Proteaceae, Papilionaceae, Epacridaceae and Casuarinaceae.

WPC Community 9: Grassy Woodland (Fig. 7c).
(2 sub-communities; 60 sites).

An open-woodland to woodland occurring on clay soils, mainly on the western side of Western Port between 5 m and 35 m. This is one of the most floristically rich communities of the study area and also the most weedy. Most of the introduced species are grasses and herbs of pasture origin dispersed amongst the native grasses and herbs which naturally dominate the understorey.

WPC Community 10: Unnamed (Fig. 7d).
(1 sub-community; 6 sites).

An open-forest found on clay soils in the south of the study area between 15 m and 70 m. The tree, *E. pauciflora*, is normally associated with subalpine regions (e.g. Gullan *et al.*, 1981) and only occasionally occurs at lower altitudes. The understorey of Community 10 is principally that of a grassland which has been disturbed by grazing and fire.

WPC Community 12: Unnamed (Fig. 7e).
(1 sub-community; 4 sites).

A low woodland on poorly-drained, sandy soils on Quail Island and at Warneet, near sea level. The distinctive feature of this vegetation is the dense swards of the lilies *Lomandra longifolia* and *Dianella revoluta* which dominate the understorey beneath a canopy of *Eucalyptus viminalis*.

WPC Community 13: *Melaleuca ericifolia* Scrub (Fig. 7f).
(4 sub-communities; 61 sites).

An open-woodland to closed-scrub found on wet clay soils of coastal and near-coastal regions in the study area. The principal feature of this community is the dense stands of *M. ericifolia* which may form such a complete canopy as to exclude almost all understorey plants. The range of understorey species associated with this community is quite large as they tend to be those that are common in the vegetation immediately adjacent to the *M. ericifolia* thickets. Consequently, salt marsh, heathland, grassland and forest species are all components of *Melaleuca ericifolia* scrub.

WPC Community 14: Sedge Swampland (Fig. 8a).
(3 sub-communities; 6 sites).

An open or closed-sedgeland occuring on waterlogged soils or shallow ponds on French Island, Cranbourne and Lang Lang. This community is usually dominated by one or two species of sedge with an occasional emergent shrub.

WPC Community 15: Coastal Heathland (Fig. 8b).
(6 sub-communities; 83 sites).
A closed-heath or sedgefield found on sandy soils underlain by clay, at or close to sea level. It is contained almost entirely in Quail and French Islands. The community lacks a tree layer and is usually dominated by one or more species of shrub *(Leptospermum* spp., *Casuarina* spp., *Melaleuca squarrosa)* with an understorey of sedges. In some places, where the soil is periodically waterlogged, a range of tiny annuals cover the ground during late spring.

WPC Community 16: Primary Dune Scrub (Fig. 8c).
(1 sub-community; 3 sites).
A closed-scrub found on calcareous sand of primary dunes. Confined, in the study area, to the south-eastern coast of Phillip Island. This community has been subject to severe erosion due to human trampling and many areas have been stabilised by plantation of the introduced Marram Grass *(Ammophila arenaria).*

WPC Community 17: Coastal Tussock Grassland (Fig. 8d).
(1 sub-community; 5 sites).
A tussock grassland found on calcareous sands near the southern coast of Phillip Island. The dominant species of this community, *Poa poiformis*, was much more abundant in pre-European settlement times but its range has been considerably reduced by pasture improvement.

WPC Community 18: Coastal Tea-tree Scrub (Fig. 8e).
(2 sub-communities; 25 sites).
A woodland to closed-scrub found on calcareous sands on the coast of Phillip Island, French Island and south-west Western Port. The major feature of this community is *Leptospermum laevigatum* which completely dominates the vegetation in many places.

WPC Community 19: Coastal Banksia Woodland (Fig. 8f).
(1 sub-community; 6 sites).
A woodland found on calcareous sands on the coast between Crib Point and Flinders. This vegetation is often floristically depauperate and may support little more than its major species, *Banksia integrifolia, Eucalyptus viminalis, Pteridium esculentum* (often very high cover values due to frequent fires) and *Leucopogon parviflorus*. Coastal Banksia Woodland is probably much less common now than before European settlement. It may once have been co-extensive with Coastal Tea-tree Scrub with which it has floristic and environmental affinities.

WPC Community 20: Unnamed (Fig. 8f).
(1 sub-community; 2 sites).
A low open-forest found on calcareous sands of Phillip Island. The main feature of this community is the large, old stands of *Melaleuca lanceolata* (Moonah). The ground layer has been disturbed by human trampling and contains a large complement of introduced grasses and herbs.

Sub-community Summary Sheets

The following three sets of information have been amalgamated to produce a summary sheet for each of the 56 sub-communities. These summary sheets constitute the primary means of describing vegetation in this paper.

Sub-community Distribution Maps: The distribution of each sub-community throughout the study area is shown by means of a schematic map of the study area on which is marked the location of its constituent quadrats.

Character Species Tables: These tables summarise information from the two-way tables and present it in a different format. The tables contain the character species of each sub-community, listed in order of their frequency of occurrence, and the frequency and

mean cover/abundance of each species. In contrast to the two-way tables, in which the species are arranged to demonstrate the interrelationships between sub-communities, the character species tables have the species arranged to show their relative importance within an individual sub-community.

Sub-community Descriptions and Annotations: A simple description has been made for each sub-community which includes briefly summarised information on its distribution, environment, altitude, structure, floristic richness and weed composition.

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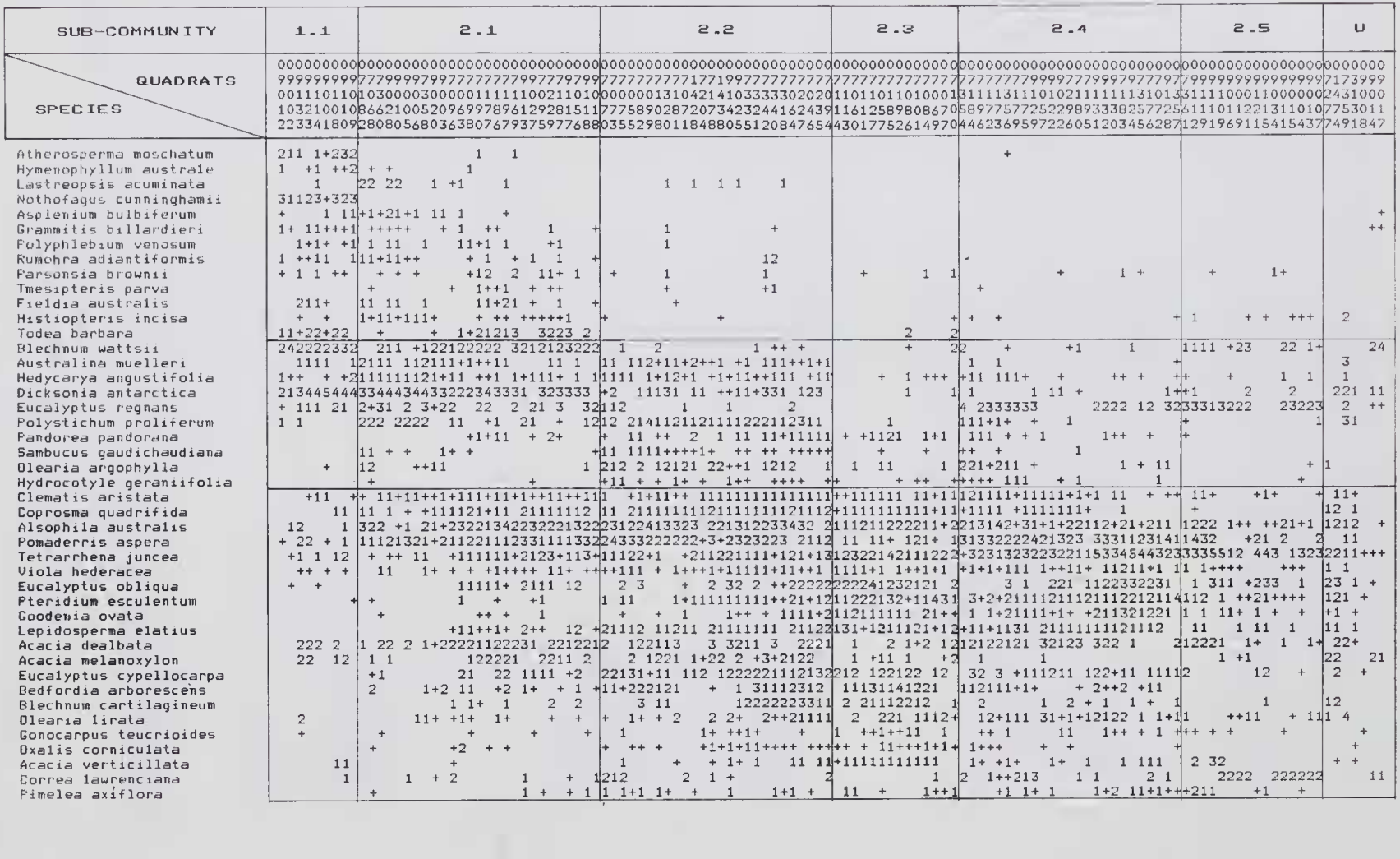
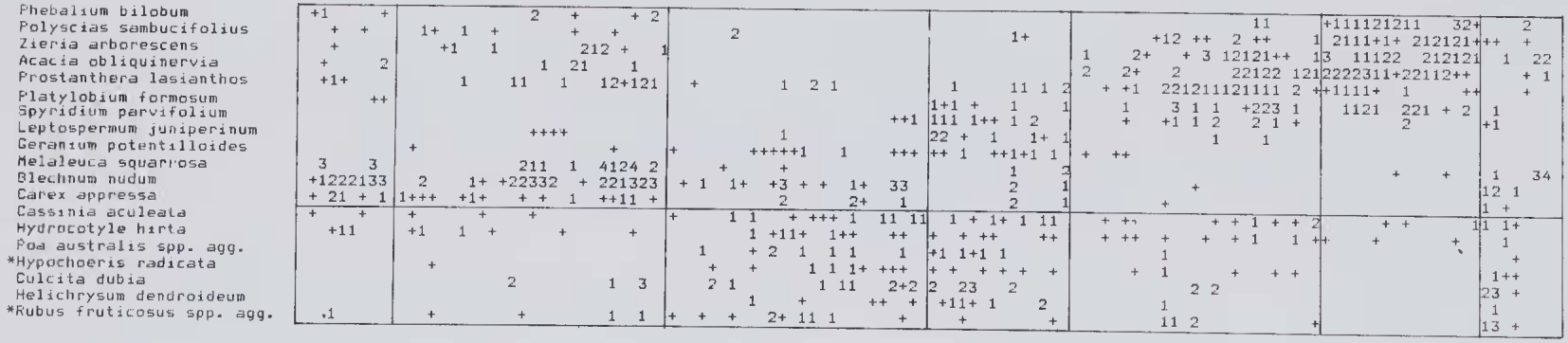
Table 1. Two-way table of Communities 1 and 2.

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Zieria arborescens
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Platylobium formosum
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Leptospermum juniperinum
Geranium potentilloides
Melaleuca squarrosa
Blechnum nudum
Carex appressa
Cassinia aculeata
Hydrocotyle hirta
Poa australis spp. agg.
*Hypochoeris radicata
Culcita dubia
Helichrysum dendroideum
*Rubus fruticosus spp. agg.

Table 2. Two-way table of Community 3.

SUB-COMMUNITY	3.1	3.2	3.3
QUADRATS / SPECIES	000000000000000000000000	000000000000000000000000000000	0000000
	977777777779799779777777	999711117777117717777117777	7777779
	021112221230200121031331	000044440000440040000440022	2221110
	394352645653053303646339	866153954002540233135555431	1455655
	284281972607786664691124	202404124570958679242360798	3363873
Platylobium formosum	+ + + + +13 11	21	
Gonocarpus teucrioides	+ 1 1 + + 1	+ 1 +	
Bauera rubioides	3 1 + + 21+ 2 +	11 +	
Todea barbara	2 3311 223 1		
Blechnum wattsii	11 2 2 1 12 + 222 1	2 1	
Gleichenia microphylla	434122 +1 1423 4122+ 1	3 1 +++	
Dicksonia antarctica	22121 ++ ++ 1 + 1+ 22 1	++ + + + + + 1	
Coprosma quadrifida	111 1 + 111111111	1 + + 11 1 + 111 +1	
Pomaderris aspera	+11 32 2 21112321	2 + 1 1 21 +221 13	
Clematis aristata	+ ++ + +1 ++11	1 1 11 + + 11 11 1	
Leptospermum juniperinum	1 12 232 122 1 + +2	2211+122+11 11 3+1 1 122 11 +	
Eucalyptus obliqua	+ 21+11 + 2+ 2++11	31122111 ++12211+ 1+21 11 + +	
Pteridium esculentum	2 + 221 1++ 11	12211+2+ 121121 +11 122221 1++ 1	
Goodenia ovata	+ 1++2+1 21 111 11	11+11+ 11111+ 2 11++3111 + 1	
Tetrarrhena juncea	11+1111111+3223111+ 12	242221112 121211111111111 1 + 2	
Blechnum minus	1121 1 1 21 11 11++211	+ 11 ++1 11 13++ 1 2+ 1	
Lepidosperma laterale	1121+2 12 3 13 22 +2	111121213122 12 22 2233 2	
Melaleuca squarrosa	3544322532322222 3344341	221 2 1 2222 2 23111	
Alsophila australis	1122++141+22 1++22211222	++1 +1 1 12 + 1+31 2+11+1++	
Poa tenera	+ 1 111121 2 12222112	22211 11112 2 +1+ 221 3223331	
Gahnia sieberiana	1 11+ 112 21 2 1111211 +	+ 1++1 21 21 + 2+ 1 11+1 222211	
Blechnum nudum	23342223 111113132142 2	12 1+21221+111 411 21 22+2+1	
Carex appressa	1 2++23 1 +1 1+1212331+	+ ++1111 1+1 + 1 1+23 3222441	
Acacia melanoxylon	2212 31 11++ 21+321+	2 +112 2 + 331 222 1121+22	
Eucalyptus ovata	1 112 12 1 2	122 +1+ 2 +1 ++ ++ + 2 2232222	
Acaena anserinifolia	+ 1 + + 1 11	+11 + +11+++ + +11+1112 1 1111111	
Acacia dealbata	1 2 12 2+ 2211	2 112+21 12 1 122211	
Oxalis corniculata	+ +1 1 +++11+	+1 ++11+ +++ + ++ + + +1+1 ++	
Gonocarpus tetragynus	+ 1 +11 +1 ++ 1	+ 111++11 111 + 1 1 11 2++1	
Viola hederacea	111 + +++ 1 1+11+	+ 1++++1 +1++ + 1 +1 11+	
*Rubus fruticosus spp. agg.	+ 2 +1+ 1 1 21	12 1+121+ 1 2 +11121 21 1 ++1	
Acacia verticillata	+1 +11 + 1+ +1+	+11+++1111 +11+11 +1111 + +	
Olearia lirata	+ +1 +1 +1++111	+1+ ++1+ 1 + 1 + 2 +	
Eucalyptus cypellocarpa	+1 + 21+ 3 21121	2 2 2 11 2 1 2 2 2 2 2	
Cassinia aculeata	1 1 1	21111+21 1+ 1 ++ + 111 1 +	
Hydrocotyle hirta	1 +1 + 1 +	+11 ++++ 1++++ 1+ ++ +	
Poa australis spp. agg.	1 1 1	31 21+21 1311 1 3 + 111 1 1 +2	
*Hypochoeris radicata	+1 + ++ + +1	11 + 11 + 1 111 ++ + ++1	
Cirsium vulgare	1+ 1 3 2 2	1 222 22 22 + 11 21	
Helichrysum dendroideum	1 + 1+	2 1 1++11 111111112 12 1	
Spyridium parvifolium	1 + 1 1	1++1 121 + 2	
Cyperus lucidus	1	11 + 2 212322	
Rubus parvifolius	+ + 1 1	+1 11 + + 1 11111 1	
Scirpus inundatus	1 1 1 1 + + +	+ 11+ 1 1+11 111 ++	
Gratiola peruviana	+ ++ + + 1	1+ 21 + + 111 1	
Cynatrix pulchella	+	+ 1 ++ ++	
Hypolepis muelleri	+ +	11 11	
Lobelia alata	+ +1 + + 1	++ ++ 1+ 1 1+++	
Phragmites australis	+ 1	2 2 115	
Polygonum strigosum	1	+ 2111	
Juncus spp.	+ 1 +	+ ++1 +1 1++	
Geranium solanderi	1 1 +	1 + +11 +1	
Leptospermum lanigerum	+ 1 2	2 1 1 3224 4	
Lepidosperma elatius	121 + 111	1 1 12 2 1+	
Blechnum cartilagineum	11+ +2	2 + 2 211	
Polyscias sambucifolius	+ + + + 1	1 1 11 + 1 11 + +	
Prostanthera lasianthos	+ 12 1+ +12+ 1	1 1 1 1 2 1 + 1	
Eucalyptus viminalis	+ 1 1	2 12 1 2 3 2	

Table 3. Two-way table of Communities 4 and 5:5.1–5.5.

SUB-COMMUNITY	4.1	5.1	5.2	5.3	5.4	5.5
QUADRATS / SPECIES	000000000000 999999991977 000000004002 455544569417 302187943606	000000000000000 777777777777777 232233333332322 328833321227099 687986472655821	000000 777777 333333 132113 603793	00000000000000000000000 77777777777777777777777 10000100001121221212111 16669045692225137323222 75211283673589204147621	0000000000000000000 000000000000000000000000000 7777777777777777799 977777999997779997777777979 0100000001112222100 011111111001000100111111010 7187958878794343965 533398322321752338121011303 8034011099084352355 635118465862643515805969079	000000 997997 011110 227126 471607
Hypericum gramineum	1++1 +	+ ++ +	+			
Galium propinquum	+ + + +	+ + + +		+ +		
Helichrysum scorpioides	1 + + 2+	1 +	+		+ +	
Geranium solanderi	++1 2+	+ + 1 1			+	
Poranthera microphylla	1+ 2+ +	+ 1 +	+	+ +	+ +	
Pterostylis longifolia	+ + 11+ +				++	
Imperata cylindrica	1+11 + +	+				
Exocarpos cupressiformis	111 + +					
*Pittosporum undulatum	312 +	1 4			1	1
Dichondra repens	+1++11 1	+ 1			+	
Acianthus exsertus	+11+ 1 + 1					
Acacia stricta	+11111 1	+			- 3	
Eucalyptus globoidea	222222	+			1	
Deyeuxia quadriseta	1111 +++ +	1 + + + 1	+	+	+	
Drosera peltata	+++ 1++1				+	
Senecio quadridentatus	1++++111 1	+	1		+ +	
Themeda australis	112 3+23	1				
Microlaena stipoides	13 21212 2+1	2 +		1		
Lepidosperma laterale	+ 1 + +1 +	11 1 22		1	+ + 11 3+ + 1 + 11 +3 + 12 1	
Adiantum aethiopicum	1113+2 2 +1	+1 1 1 2			+ +	
Glycine clandestina	11 1+11111 1	1111 2 1 ++				
Oxalis corniculata	1+11+ 11 +	1 +++++	++	+ + ++		+
Hydrocotyle hirta	+ 1 1++	+ 1+1++ +	1++	1 + + +	1	+
Lagenifera stipitata	+1 +11 11 +	+++1 1 +1 + +	+11+		+	
Lomandra longifolia	+11+2 111	1 11++ ++ +	1+ + 1	+ 1	+ +	
Epacris impressa	1 1++ 11111	+ ++ 1	+1+111	1 1+ + +	1 1 1 + +2 1+ 1 1+1 1+ 11	
Goodenia lanata	11+++ 1	11 +11+	1 1111	+ +	+ +1 + 111+ 1 1 111+111 +	
Helichrysum dendroideum	+ ++	2112+1+1+ +	1+1++	+ 2	1 2 +	2
Culcita dubia	1 2 2	2222332 +14 2	2	2 + +22 3	3 1 3 +4 3	
*Hypochoeris radicata	1111111 +	1++11+11+ +	+++1 +	+ 1 ++	+	1+
Acrotriche prostrata	+111+1 11+	++1 1+11 1	111 11	+ + 1 1 +1	11 1+1 +11 1 1211111 1	
Eucalyptus radiata	22 1 23 221	2 2 2 3+1111	1 112	+11+1 1 1 1 1 +	122 +21 1 11 22222 12 1+ 11+1	1
Gonocarpus tetragynus	111 1 211+1	11 + 111111++	1 11+1	1+ 1 +11	1 1 +1 11 1 1+ +	1
Cassinia aculeata	2111 1211 1	1+21 + 2 ++1+	1	+1 11+ ++1 1 1 1 + 1+	+ + 1 21 111 + + 1 + +	+
Poa australis spp. agg.	211 42 1+2	1112 12222+212	++1211	1 + ++ 11 1 1 + +1	+ 11 + 1 11 + 1 11	4
Leptospermum juniperinum	3 1+ 22 2	1 12 11 221213	+21112	+ 122 + 11 211+	21 +1 121111123 112+ + 11 211 11 1 1	+
Eucalyptus obliqua	1 22 2322	2 2232 12 23221	12211	31 232122132222322221 21	22112212211112 21232 121 1 22 1 121 1 21	222322
Pteridium esculentum	2+11+12222	31233331224+2	13111	2212 12 2122222222112+	22 121211 131212122 22211+1221221211111112221 12	+11222
Tetrarrhena juncea	2+32 43	22121111122222 1	+11111	2 13222334122132322121 1	22222322234332 32 33 22223343323241 321221221221	334451
Viola hederacea	1111+111 1++	11+11+1111111+1	1111+1	11++++ + 1++1+11+1+ 11	+1+ 1++11 1 ++11 +11 11 + 1+++111+111+1+	+1111+
Goodenia ovata	1 1 1	1+++22+21+1++1	+	1+113 1241111+1212112 1	11+11+133 +1111+2 111+ 1211 + 1 111+ 1 1 1+	13221
Spyridium parvifolium	2 1 1 3	2 + 11	+ 2 2	23131221232112+2 32231 2	2232332234 232322 1 1524212131212221 3112+2332	22 13
Gahnia radula	1 1 2112	1111111 11 1	+ 131	1 2 111 21 +	+ 1 11 1132 2 1 1121112212+	
Billardiera scandens	1 1 1+1	1 ++1 + 11+ ++	+11 ++	++ +1+1 1+1 + ++	1 ++ ++2+1 111 + ++ +++ 1+ 1+++11	
Clematis aristata	+++ +2++	+1++1+1+11++	++ +	1++ +1 + 11 1+ 1 1 1	+ + ++ 1 +1	

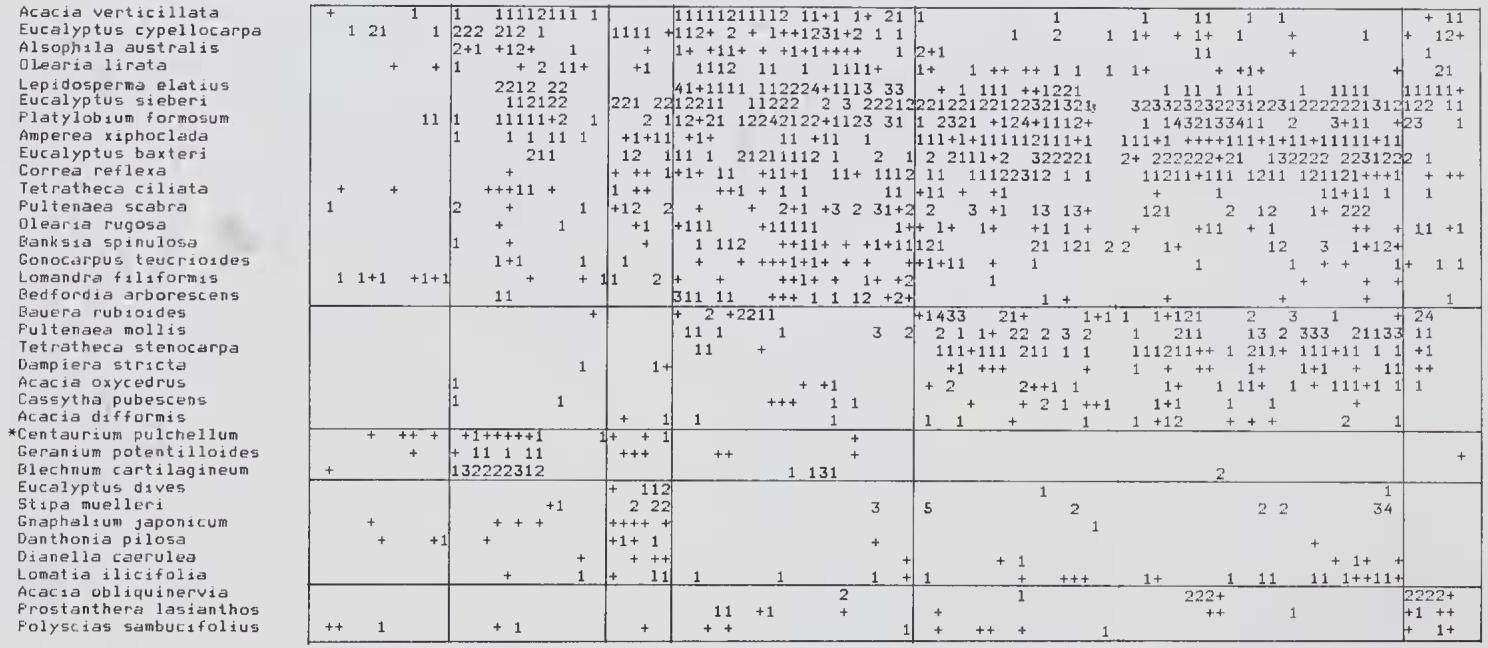
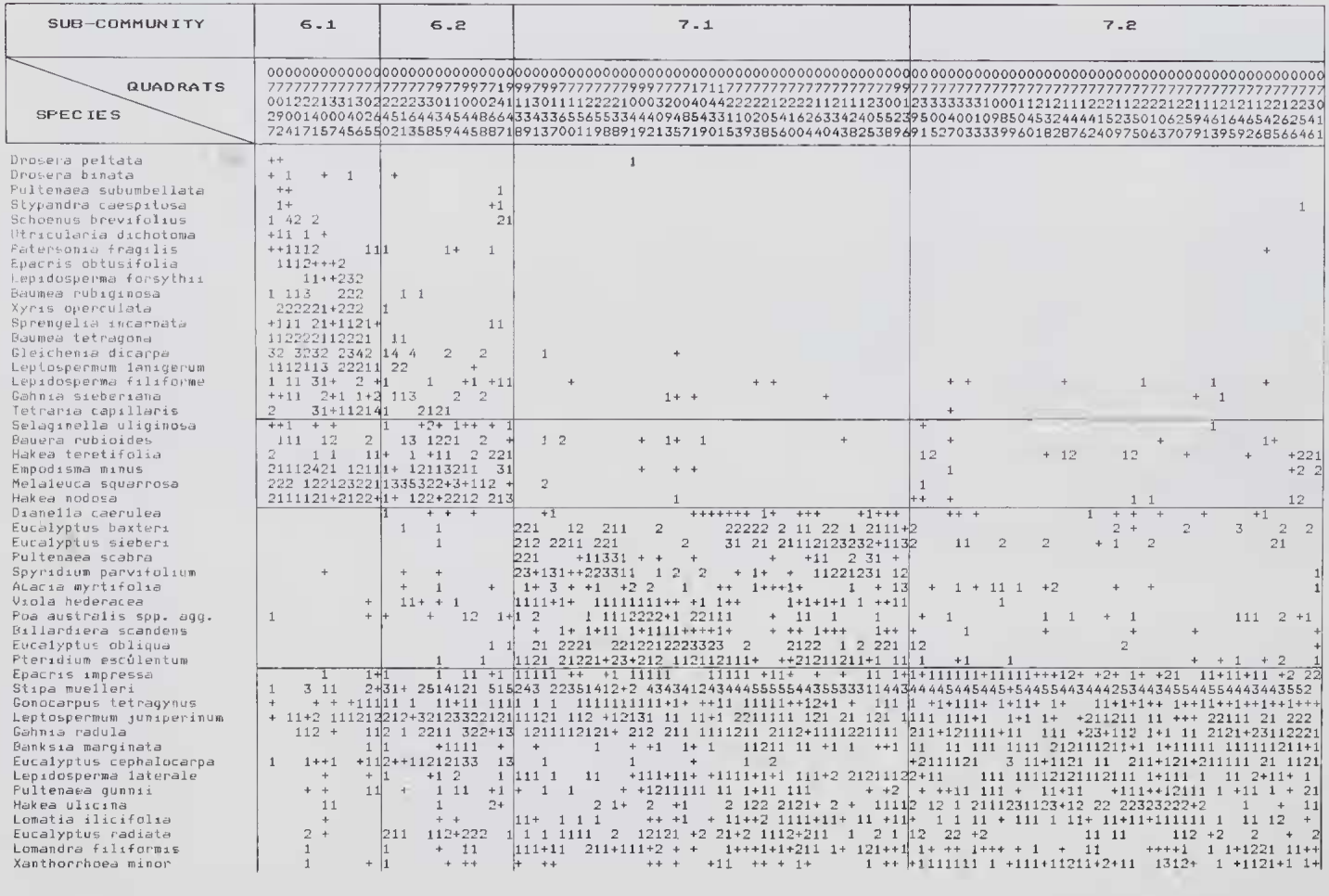

Acacia verticillata
Eucalyptus cypellocarpa
Alsophila australis
Olearia lirata
Lepidosperma elatius
Eucalyptus sieberi
Platylobium formosum
Amperea xiphoclada
Eucalyptus baxteri
Correa reflexa
Tetratheca ciliata
Pultenaea scabra
Olearia rugosa
Banksia spinulosa
Gonocarpus teucrioides
Lomandra filiformis
Bedfordia arborescens
Bauera rubioides
Pultenaea mollis
Tetratheca stenocarpa
Dampiera stricta
Acacia oxycedrus
Cassytha pubescens
Acacia difformis
*Centaurium pulchellum
Geranium potentilloides
Blechnum cartilagineum
Eucalyptus dives
Stipa muelleri
Gnaphalium japonicum
Danthonia pilosa
Dianella caerulea
Lomatia ilicifolia
Acacia obliquinervia
Prostanthera lasianthos
Polyscias sambucifolius

Table 4. Two-way table of Communities 10 and 5.5.6–5.9.

SUB-COMMUNITY	10.1	5.6	5.7	5.8	5.9
QUADRATS / SPECIES	000000000000000000000000000000000000000000000000000000000000	333443484444444448844444448888888884448899999933393933	000110000000000000000000000000000000000001000011101111	333992426656342555246996287987848872218608877333790 99	435454001642691701287545335904913587989403944058 5043
Eucalyptus pauciflora	++1+32				
Casuarina littoralis	++143				
Acacia paradoxa	12 ++				
Lepidosperma laterale	1123	1		+	+21 1 +
Themeda australis	+51 4+				
Daviesia latifolia		+22+3 3+			
Platylobium obtusangulum	++	1 ++11122+11212 1			
Gonocarpus teucrioides		1 +11+112+21222 +1	12	1 +	+
Banksia marginata		1 ++221 11 +		1	2+1
Hypericum gramineum	+++	++ 1 11 2 1	++	++11	+ + + ++
Acacia stricta		2 2++ + 33	+	+ 1 ++1	++121+11
Drosera auriculata		+ 1++++1 1++	++	1++++ +	+ +++ +
Epacris impressa		1 ++2+11 1222 +		1 +	2111 ++
Gahnia radula	21131+	2 22222323+ 2222+13	21	2122411+11	3322 2 +
Leptospermum juniperinum	1++	3323 2 2323333332+3	21	11212+33	121 1 2
Eucalyptus obliqua		433332 2+33222	333	3211+4 32	4323231332 34
Pteridium esculentum	1 1	15 1111+1 2 21124	423	211 1+++3	4323331343234
Tetrarrhena juncea		3233223+333242 52		2+ 1	21323522
Acrotriche serrulata	+	+ 1+1++2212121+ 1	+	+1+1	+
Billardiera scandens	1	1 +1 2 +11+ 1+ 1		+11++1+ 1	1
Hakea sericea		2222+21 + +2+ +		22	
Acacia myrtifolia		+ 1+2 2 1+2+2 +1			+ 1
Glycine clandestina			11+	+1 +++1	++++++
Dichondra repens	+		112	11+12++ 1	++ ++
Clematis aristata		1 +	21	1111 12	+ + ++++ 1++
Oxalis corniculata	+++		111	+1 1 1+	1 ++ ++ ++++
Viola hederacea	++	11	11+	+++11+1+11	+1++11+111+++
Poa australis spp. agg.	++ +	1	+12	21 1 +1	1 222 21122
Gonocarpus tetragynus	+++11+	1 +	1	111 1+	11 11+++ +1
Acaena anserinifolia	2		11	+2 1+	1 + + +++ +
*Hypochoeris radicata	+++		2	2+11	1+ 1 +++11+++
Microlaena stipoides	1		112	12311 11	21 12 2
Lagenifera stipitata			1++	1 1 1+	+ + ++1
Comesperma volubile	++	1 + +	1+	1 +	++ + +
Lomandra filiformis	+ + +	+ 21	++		1+ + ++
Poa tenera					
Acrotriche prostrata				1	3 22 + 22
Hydrocotyle laxiflora	+				1++ + ++
Eucalyptus radiata	1 1	+ 2		3	++1 1 +1
Goodenia ovata		1		++3+	12 32 + 21
Acacia mearnsii	1+ +	23		2 23	1 + + 1
Pultenaea daphnoides		+ + 1 +		1 + 2 +1	2
Adiantum aethiopicum					3
Lomandra longifolia	+1 2	+	1	1	1 + 1+ + 1 1 +

Table 5. Two-way table of sub-communities 6.1, 6.2, 7.1 and 7.2.



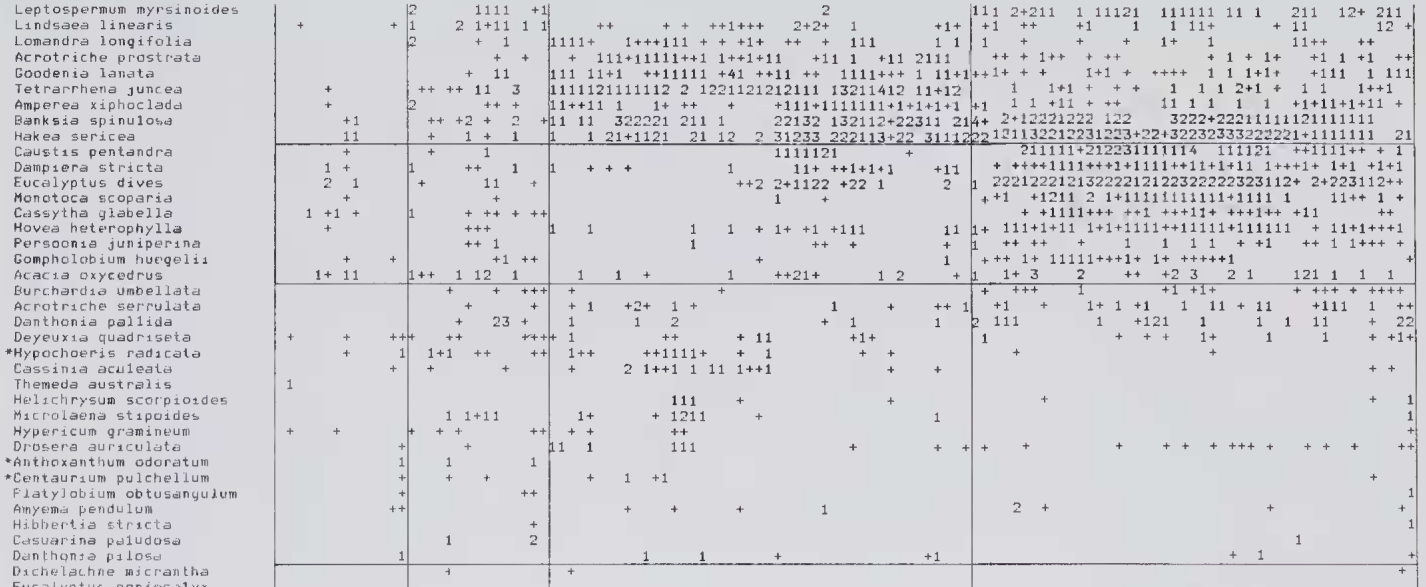

Leptospermum myrsinoides
Lindsaea linearis
Lomandra longifolia
Acrotriche prostrata
Goodenia lanata
Tetrarrhena juncea
Amperea xiphoclada
Banksia spinulosa
Hakea sericea
Caustis pentandra
Dampiera stricta
Eucalyptus dives
Monotoca scoparia
Cassytha glabella
Hovea heterophylla
Persoonia juniperina
Gompholobium huegelii
Acacia oxycedrus
Burchardia umbellata
Acrotriche serrulata
Danthonia pallida
Deyeuxia quadriseta
*Hypochoeris radicata
Cassinia aculeata
Themeda australis
Helichrysum scorpioides
Microlaena stipoides
Hypericum gramineum
Drosera auriculata
*Anthoxanthum odoratum
*Centaurium pulchellum
Platylobium obtusangulum
Amyema pendulum
Hibbertia stricta
Casuarina paludosa
Danthonia pilosa
Dichelachne micrantha
Eucalyptus goniocalyx
Acacia stricta
Stipa nervosa
*Aira caryophyllea
Dianella revoluta
Pimelea humilis
Dipodium punctatum
Lepidosperma tortuosum
Pultenaea hispidula
Pultenaea mollis
Dipodium punctatum
*Rubus fruticosus spp. agg.
Danthonia setacea
Daviesia virgata
Dillwynia sericea
Acacia difformis
Goodenia ovata
Platylobium formosum
Correa reflexa
*Erica lusitanica
Helichrysum dendroideum
Bursaria spinosa
Xanthosia dissecta

Table 6. Two-way table of sub-communities 7.3–7.5.

SUB-COMMUNITY	7.3	7.4	7.5	U
QUADRATS / SPECIES	000000000000000000000000000000000000000000000000000000 911111111177117777177777771111117777777771777977717711 044444444400440000400000004444440000000004000000040044 564699574703764124623121404635552332343316123400030137 408902806326281792515928319455748873300156042064339621	000000000000000000000000 777777777777777777777777 233332323332223223233220 715406393117792791842961 042494749013452975239073	0000000000 7777777777 2222222222 8788877888 4215081368	0000000 7997777 0002232 1660526 0312342
Drosera peltata				
Drosera binata				
Pultenaea subumbellata				
Stypandra caespitosa	+ +	1	+	
Schoenus brevifolius				
Utricularia dichotoma				
Patersonia fragilis		+		
Epacris obtusifolia				
Lepidosperma forsythii				
Baumea rubiginosa	+			
Xyris operculata				
Sprengelia incarnata				
Baumea tetragona				
Gleichenia dicarpa				
Leptospermum lanigerum	1			
Lepidosperma filiforme	3 + + ++ 1 1	1 + + +		2
Gahnia sieberiana	+ + + +	1	+	21 1
Tetraria capillaris	+ +1 1 ++	1	1	
Selaginella uliginosa	+ +	1		
Bauera rubioides	1	1 1		342
Hakea teretifolia	2 22 1 211 +1 1	+ 1 1		
Empodisma minus	1 + 1 +1 2 + 1 + + + 1 2+	+ + +1	1	
Melaleuca squarrosa	+ 1 + +	+		3
Hakea nodosa	21 12 +2 + + +11 11 111+1 1 +1 3 1 +1	+ 212 1 1+	1	
Dianella caerulea	+ + + 1	1 + ++	+	+
Eucalyptus baxteri		2 121 12		
Eucalyptus sieberi	+	2 12 2 2		2
Pultenaea scabra	+	1 1 1		
Spyridium parvifolium	+ + 2+ 1 1 1 2 + + 3+1 1 1	11 1	+	3 +1
Acacia myrtifolia	11 11 + ++1 1111+2 11+1+111++1++ +1+ 1	+1+ 2 1 1 1+		
Viola hederacea	+ + + + ++ + ++1 + +	++1+ +1 + 1+ +	1 1+1 111+	+ 1
Poa australis spp. agg.	11 + 1 1 12 2 1111211 221111112 11111 113 11 1+2	1 12 12+22 11131 222112	223232232	+ +1
Billardiera scandens	++1+ 1 + + + + +11+++++ 1+++++ +11 11++	+++1+1++ + +++ 1+	+1+++ 1++	1 +
Eucalyptus obliqua	22+3213+3 + 123122 1 11 12 211 + 2 23	21312122 232 11321 1 223	112 2 3 1	1 1
Pteridium esculentum	+ 1 1 1+ 11 11 11 +1 211 3	++21+11111 12112 111 1	1 +1 3+ 1	12 1
Epacris impressa	1111111+11+111 +12 111+11+ 11+11 ++ 1+1111 1++ +11++	1+1 11 11 1 11 11++11	111+11111+	111 1
Stipa muelleri	34544533242134143333342323224323342342+3 352	454243353453352 24 1 3	1	12
Gonocarpus tetragynus	111+1111+1++1+2++11+111+1111111111+1+1+111+ 11 111++1+	11+11 111111111111 1111+	1111111	+ 1 111
Leptospermum juniperinum	11212222121121211231221112223322112111122421 11122132+	2+11 11121113111+++1221	1121+2 +	23223 3
Gahnia radula	42212111112222 1 1112221+112211111211111111212 1+11222	2+121+2 1121+213211 +111	1++1121 12	12 11++
Banksia marginata	111+1+ 11+ ++1 11 121+1+111111+11 1++1+1 111 1+ ++	+111 +1 11+ 1 +++ + +1	1	1 +
Eucalyptus cephalocarpa	222+21 2+22222122221232 22122+22222221121 212+2 2 1	2 2 22 1 21	2	12
Lepidosperma laterale	11 1 1 11 2 11 +11 11 + 11++11 1+ 1 ++ 11 +	2112+ 211+ 11 +11 +	1+1+ 1 +	+15
Pultenaea gunnii	+111 + + 1 + 1 2 11111 1+21+ 1 ++ 1 1 1 ++	1111 1 +1 1 1 11 1	1 1 1 11	1 1
Hakea ulicina	121 2132 21122 1222+3112 + + 2222 +2 221 2 3+3 11+	21+ 1 11 3 11	1	1 +
Lomatia ilicifolia	+ + 1 ++ +++ ++ + +	++++ 2 ++1	1 1 +1	1
Eucalyptus radiata	1 + 12 1 22 1+ 22 1+1132111211 2122+++ 21 +	112111 122122 2 + 1	2 11	2 323 +
Lomandra filiformis	+ + 1 + 1 ++ 1+1+1 + +1 + +1+1+	1 21+++ 2111+21	111+ 111	+ +1
Xanthorrhoea minor	+ 1 1 11++++11 +++ ++++ 1++ +	+11++ +1 + ++ +1+ ++	1 + ++1 1	11 1

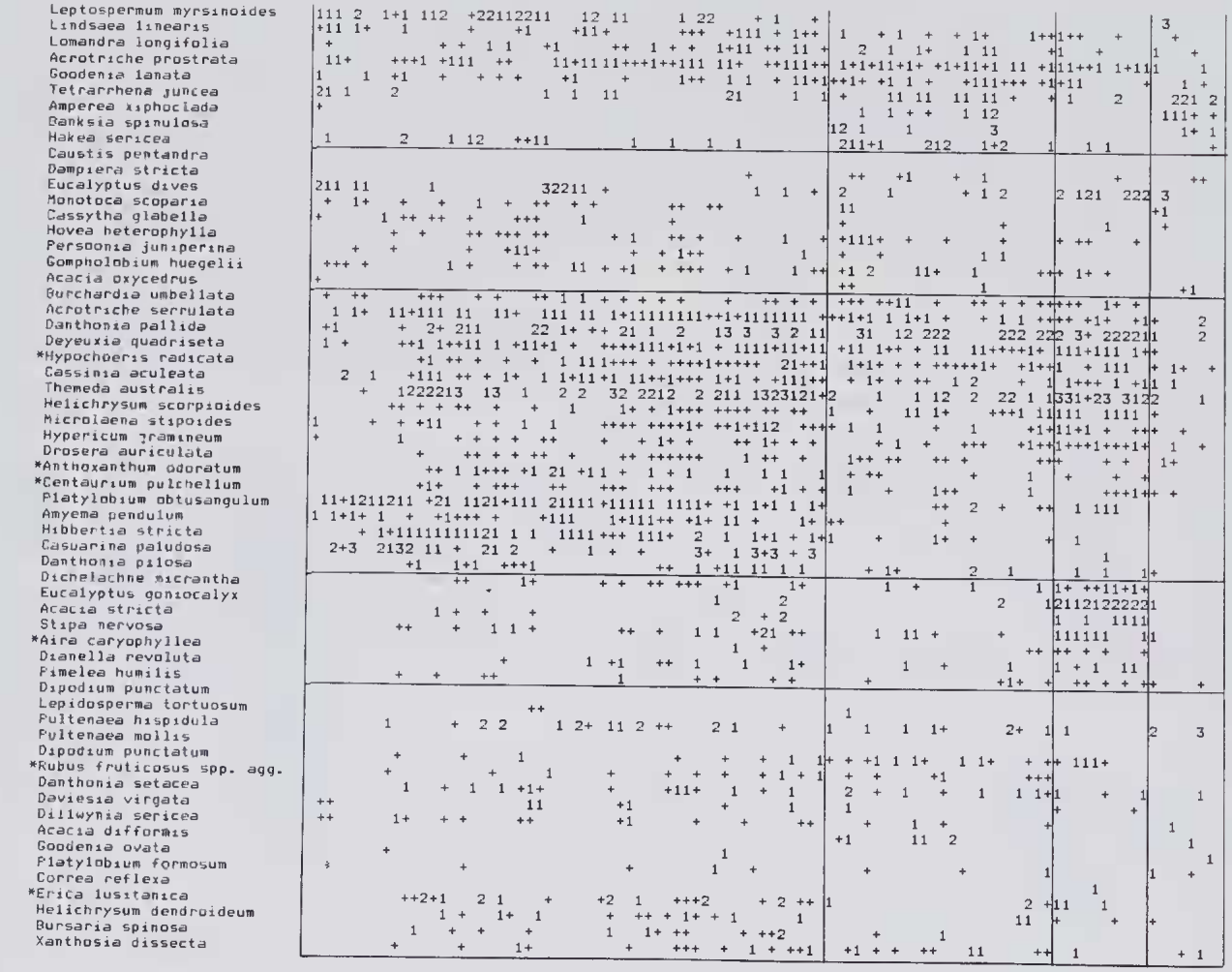

Leptospermum myrsinoides
Lindsaea linearis
Lomandra longifolia
Acrotriche prostrata
Goodenia lanata
Tetrarrhena juncea
Amperea xiphoclada
Banksia spinulosa
Hakea sericea
Caustis pentandra
Dampiera stricta
Eucalyptus dives
Monotoca scoparia
Cassytha glabella
Hovea heterophylla
Persoonia juniperina
Gompholobium huegelii
Acacia oxycedrus
Burchardia umbellata
Acrotriche serrulata
Danthonia pallida
Deyeuxia quadriseta
*Hypochoeris radicata
Cassinia aculeata
Themeda australis
Helichrysum scorpioides
Microlaena stipoides
Hypericum gramineum
Drosera auriculata
*Anthoxanthum odoratum
*Centaurium pulchellum
Platylobium obtusangulum
Amyema pendulum
Hibbertia stricta
Casuarina paludosa
Danthonia pilosa
Dichelachne micrantha
Eucalyptus goniocalyx
Acacia stricta
Stipa nervosa
*Aira caryophyllea
Dianella revoluta
Pimelea humilis
Dipodium punctatum
Lepidosperma tortuosum
Pultenaea hispidula
Pultenaea mollis
Dipodium punctatum
*Rubus fruticosus spp. agg.
Danthonia setacea
Daviesia virgata
Dillwynia sericea
Acacia difformis
Goodenia ovata
Platylobium formosum
Correa reflexa
*Erica lusitanica
Helichrysum dendroideum
Bursaria spinosa
Xanthosia dissecta

Table 7. Two-way table of sub-communities 8.1 and 8.2.

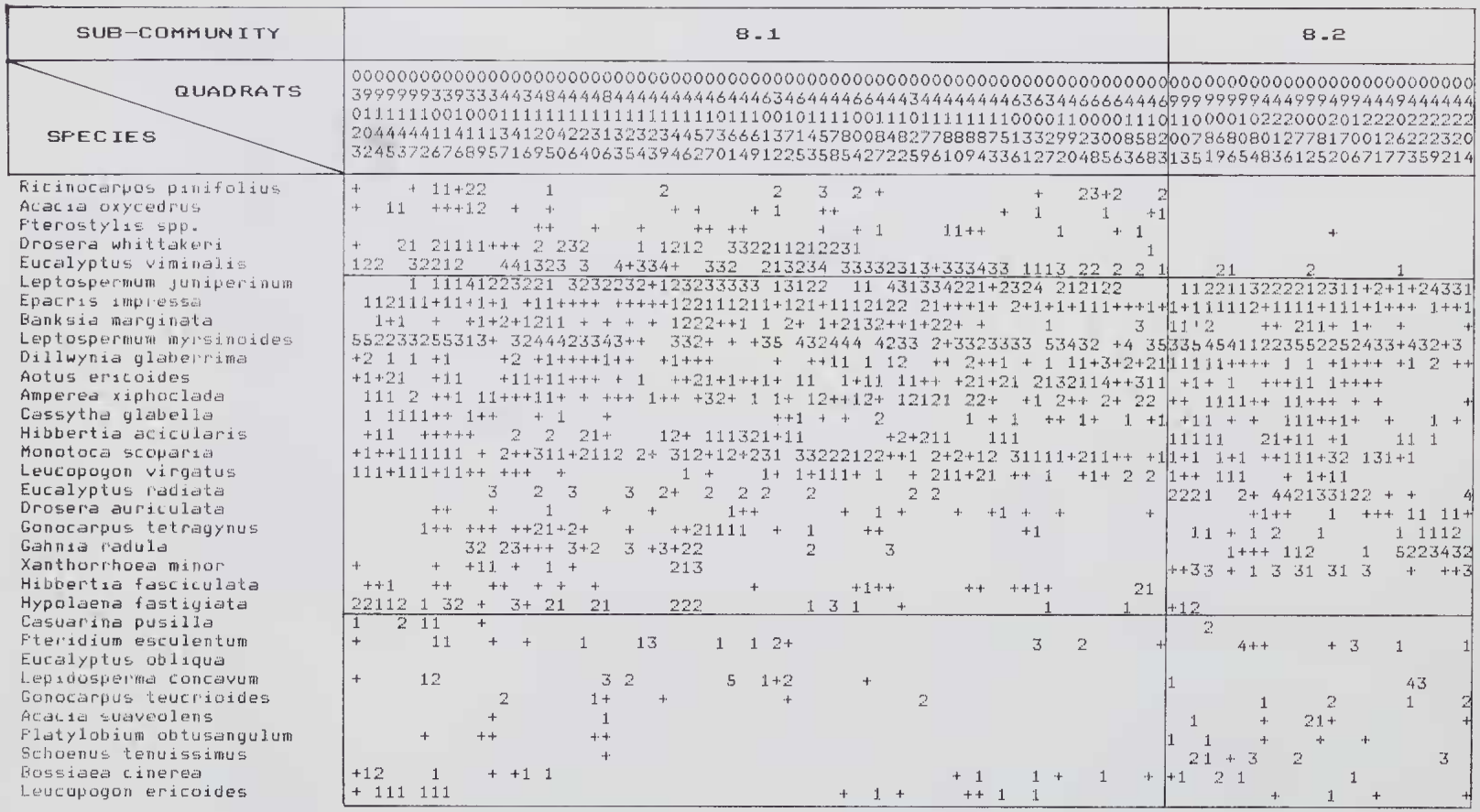


Table 8. Two-way table of sub-community 8.3.

SUB-COMMUNITY	8.3
QUADRATS / SPECIES	`0000000000000000000000000000000000000000000000000000000000000000`
	`4448484848444444884884844888444444488888884488884888888888884884`
	`0000000000000000000000000000000000000000000000000000000000000002`
	`7354150717898298713647770012213947638607381054247484231870135100`
	`6094495620366694715318214181932134377624168666723028389083451659`
Ricinocarpos pinifolius	
Acacia oxycedrus	`                                                   1         2  `
Pterostylis spp.	`                                  1            1          +  `
Drosera whittakeri	
Eucalyptus viminalis	`                   2 +           +                               `
Leptospermum juniperinum	`+232322423+21++123+22 12 22++2212+223222232 1123213+41 3 2222322`
Epacris impressa	`+1+122+22+121 +++1+11122211222+1++111112111 112+112111111121222+`
Banksia marginata	`2+2+12+1+  +112+11+1 11++ 22+++121+111+1112+211 + 11+1 1 11121++`
Leptospermum myrsinoides	` 2 13 13242234232 4+333343332+ 22342123 1323433 2343353+544324+`
Dillwynia glaberrima	` +1121221+22221+1 1111221+122++1++211121+1+1111112212112121212 2`
Aotus ericoides	` 2  1+211+2+11 12 22122+222+2+ 121111 21122121+ 111121122111111`
Amperea xiphoclada	` + + ++++  +1++11  + +2+12+11   1 1 ++1  ++     1+1 +1+1 1 +11`
Cassytha glabella	`   1121 1 121++  111112   2       +  12 1  121+1111111211+11+`
Hibbertia acicularis	`   1              1 211211++ ++11+1113++   112 2111111+11112++2`
Monotoca scoparia	`  +   2+ +1212+ +2122221212+++1+111111   ++122+ 212+21 111111 +`
Leucopogon virgatus	` 1        +1++1    1111+221     +111  +1    111 21+211211121+ 1+`
Eucalyptus radiata	` +   2       2       +       23 2+2+ 1     ++11   +++1 1`
Drosera auriculata	`12++ 1 11+1      +     1 +++     1 1+1+  ++ +1+    ++    +         + +`
Gonocarpus tetragynus	` 1                                1  1  1  +    1 12        1`
Gahnia radula	`212232 322        11 1   +      23212 213121322 ++ 21       2  1 11`
Xanthorrhoea minor	`  +2                 ++          + 2  1 +211   1++ 2 + +  1    1 2 3`
Hibbertia fasciculata	`     1+   ++21+111+   +121  2++ + 2+  1+11  +     1 +1111    1 ++1`
Hypolaena fastigiata	` + 232       3       +3+41 3   33      2         213+1 2132 3 233233`
Casuarina pusilla	`   2 1   1              1                2 +        212   +21112 122 32`
Pteridium esculentum	`2  1  2    121  1321       +323   +2+21232 124+3 ++++4+++12+  2     +`
Eucalyptus obliqua	`33       +         12 1  12 +    + 323 +213+23       3         +1  1+4`
Lepidosperma concavum	`+2 2 1       2   1 +2222 112 21222222 1+3+212111222121212 2212222`
Gonocarpus teucrioides	`21+    2  1+++     1111+  1 1111111221 11 12 12+  12 1   111 111    1`
Acacia suaveolens	`+2 +   + + +       11211     ++ ++21++++1   11312211+1+11 +1+1   11 1`
Platylobium obtusangulum	`13 1   1               + 1          ++1+11 2+  1  11 12    1  + 12111 +`
Schoenus tenuissimus	`  ++ + 22               32 + +    +          +   1    2  1          2 1 +242`
Bossiaea cinerea	`  1   1    2 1  211            2 2 +2112+      +2      +   1`
Leucopogon ericoides	`           1132+2+1      22    + +           2          +    2`

Table 9. Two-way table of sub-communities 8.4–8.6.

SUB-COMMUNITY	8.4	8.5	8.6
QUADRATS / SPECIES	`00000`	`00000`	`0000000000000000000000000000`
	`94444`	`44446`	`3333339499444444336366666344`
	`02222`	`11110`	`0011001110122212110000000011`
	`82321`	`54442`	`2122770148930091013231233297`
	`72087`	`15790`	`2461757888840165189847136634`
Eucalyptus viminalis	`1    `	`334 2`	`22 213 222     3   313+332232`
Leptospermum juniperinum	`22223`	`22221`	` +41+113342++12215+132+   32+`
Epacris impressa	`1+22+`	`+1+ +`	`++++++++ 1   +    +1++1     +`
Banksia marginata	`     `	`1   3`	` ++ 1++    3      11    +`
Leptospermum myrsinoides	`13443`	` 2   `	`12++ 1                +`
Dillwynia glaberrima	`+11+ `	` 1   `	`+   ++ +        + +  +`
Aotus ericoides	`     `	`+    `	`+   +1 1  +  1      1+ +`
Amperea xiphoclada	`1    `	`     `	` +     2       2           +`
Cassytha glabella	`  1  `	` 1   `	`    +             +1`
Monotoca scoparia	`     `	`+   +`	`   +11               + 1    1`
Eucalyptus radiata	`2    `	`     `	`         1`
Drosera auriculata	` +1 2`	`     `	` +   +    1 1+   1    +`
Gonocarpus tetragynus	`12++ `	`+   2`	`++1 + +     1 112+    2`
Gahnia radula	` 4333`	`34335`	` +   11     44 4 3+`
Xanthorrhoea minor	` ++  `	`+ +3 `	`    1                1`
Pteridium esculentum	`+   +`	`     `	`5435352313311+211 55 5555324`
Eucalyptus obliqua	`13+23`	`     `	` 2             +234`
Lepidosperma concavum	`     `	`3   1`	`2 1     1              1 ++`
Gonocarpus teucrioides	`    2`	`     `	`         +  1                +`
Melaleuca squarrosa	`     `	` 1 3 `	` +         12   44 4`
Ranunculus sessiliflorus	`     `	`    1`	`                    + + ++2`
*Holcus lanatus	`     `	`     `	` +1              +    ++ + +`
Lagenifera stipitata	`     `	`    2`	` + +       +          +1  1+`
Pterostylis concinna	`     `	`     `	`                    2 11     +`
Acianthus exsertus	`     `	`    2`	`    +                 +2121`
*Stellaria media	`     `	`    +`	`                    1  + +1`

Table 10. Two-way table of Community 9.

SUB-COMMUNITY	9.1	9.2	U
QUADRATS / SPECIES	000000000000000000000000000000000000000000000000 344484434433333333383883443444334899433333443333 111111101111110111111110220222112100201100022100 0 156202272511008000110108019100122177111222710388 7 490821260420650438159243544836784963029901492356 3	00000000000 88888888888 01011011101 91900911090 90873743059	0000000000 3844843434 8 0011021211 1 8923932239 1 1372612027 7
Casuarina paludosa	3 +1+ + 2++ + 3 3	1	+ + 2
Eucalyptus viminalis	1 42 3+ 1 3 3	1 2 11	32 4 2 +2
Eucalyptus ovata	3 1 1+ + 1 + 2	+12 3	3 22
Patersonia occidentalis	3 1 + + 2 1 1 1	++ +	1
Lepidosperma laterale	231 1 4 + 1 ++++1 + 2 + + 1+	1+1 111 11+	2 + 1
Leptospermum juniperinum	++2 4+3423315131+533242++221+++32 + 3 4++ 21+11	1211+1 11++	1++ 4 3
Hypericum gramineum	+2 11+ 1+++ + ++11+ 22++2+121++ ++ 21+++	11 1+1+1++1	+ 1 + 1+
Acrotriche serrulata	1++ + ++ +1 ++12 1+2 12+ +231++ 1 1++ ++ +2 +++	+++1111+1++	
Gonocarpus tetragynus	12 + +++ +1+ 1 11+ + 1+ 1 ++++++121+++	11111111++1	+ 1 1 + +
Themeda australis	3112+ 111+225 132215 4 32311+22++1+233	1+121121121	1
Epacris impressa	1 + 11 +11 1+++ 11+112 1++ + + +21+ +	2 +++11	+ + +
Hibbertia stricta	22+ +1+11+11++1 + 1+12+ + 1 + ++ 1	111 1+1 +++	+ 1 +
*Hypochoeris radicata	+ ++ + ++ ++++ + +11+1 + ++ 211 ++ ++ ++++	+2+1+1+1112	+ + 2 + 1
Drosera auriculata	+++ + 11+1++1+1 +1 1 ++1++++	121+11+111+	+ 12 + +
Bossiaea prostrata	11+ +1++ 1 + ++ ++ + +	++ 111 1 +	+
Pteridium esculentum	1 + 4 1 +1 2+2 +212+ + 215221+2	+11++1+2 2	55 114 +
Poa australis spp. agg.	1 1+ + 11+ 2 +1422 11+11 2 +++	12 111 +11	+ + 1
Eucalyptus radiata	++ 222 2 22 11 22323311 212 2	11 2 211	312 4
Lomandra filiformis	1++ 11 +1 11+1 1 11 ++++++ +1+++	+11+11+111	1
Viola hederacea	1 + 1 11 21 +1 12 + +1 ++++	+1++ +++ +	+2 ++1
Pimelea humilis	+ 1 +++ + +1 ++ +++ +	+11+1++	+
Lomandra longifolia	1 + 1 + 1+ ++1 2 +2 1 1 211 +1	++2+ +21	1
Acacia verticillata	+ 1 + 1 + 1 + + ++1++	++1 111	2 1
Lagenifera stipitata	+ + 11 1+ + +++	+ 1+ 1++	1 + +
Oxalis corniculata	+ + 1+1 ++ +++ +++	++ +1+++	+ + +
Acacia paradoxa	+2 12 1 1 ++ 1++	2+112112 1+	+
Billardiera scandens	+ ++ 1+ ++1 + + + ++ +	++ 1++ 1	
Burchardia umbellata	+ +1 1 +1 + +++ ++ + ++++ ++	1+1+11 +	
Tricoryne elatior	11+1++ ++ +++ +	1111+2+11	
Microlaena stipoides	+ + 1++ + 223 1+++	112111+ 113	++ 1 5
Schoenus apogon	2 + 1 + 1 + +	1+111+ 1 +	+ +
Stipa pubescens	+ 1 1+ + + + +++	1111111+1	
Poranthera microphylla	1 + + ++ ++	+11111 +++1	+
*Holcus lanatus	+1 + 1 +++ +	+ ++ 1+1	+1 2 1
Deyeuxia quadriseta	2 1 + + 1 + ++1 1	1111++111	1
Dichopogon strictus	+ + ++ +	+11++1 +++	+
Exocarpos cupressiformis	1 + + +	+ +11+1 +	+
Acacia melanoxylon	+ 1 + 1 1 3 +	1++1 1 1 +	
*Briza minor	+	1++ ++1+	+ + +
Casuarina littoralis	2 +	1121 11 3	1
Acacia mearnsii	+ +	+ 22 1+ 1+	1 3
*Anthoxanthum odoratum	2+	11111 2 31	+ 3
*Aira caryophyllea		121111 +	+ 1
*Briza maxima	1	++1+ + 1+	1
*Rubus fruticosus spp. agg.	+1 + 1 +	1++ + 21	+ +
Pentapogon quadrifidus	+ 1 +	++1+ 1+	
Eucalyptus obliqua	1 + 23 33+333 23 33 3433211	1 1 2 2	2
Xanthorrhoea minor	1 +1 1++1+21 1 + 2+ 3 1 1 +11 +1 2+	1+ + 1	
Gahnia radula	1333 2 +412211 1 3+ 32 1 31+ 11+++ 123	3 +14	+ 4 3 2 2
Platylobium obtusangulum	1 + 11+1 + +++ + +1 + 1 +	+1 + + +	
Opercularia varia	1 + ++ + 1 + ++ 1 + + ++	+ ++1 1	++ +
*Pinus radiata	+ + 1 + +	11+ +1	+
Comesperma volubile	++ 11 + + ++1 + + + ++ + +	+1+	++ +
Dianella revoluta	+ 1 + ++ + + ++++ + +	+ 1 +	
Banksia marginata	+ ++ ++4 ++ 11 ++++ ++2 ++	+	
Dillwynia glaberrima	111 +111 + 1 ++ +	1 1 1	
Astroloma humifusum	1 + + + + +1 + 2 + + ++	1	+
Gonocarpus teucrioides	+ + 21 222 1 1 1 1		1

Table 11. Two-way table of Communities 12, 13:13.1–13.3 and 14 and sub-communities 6.3 and 18.2.

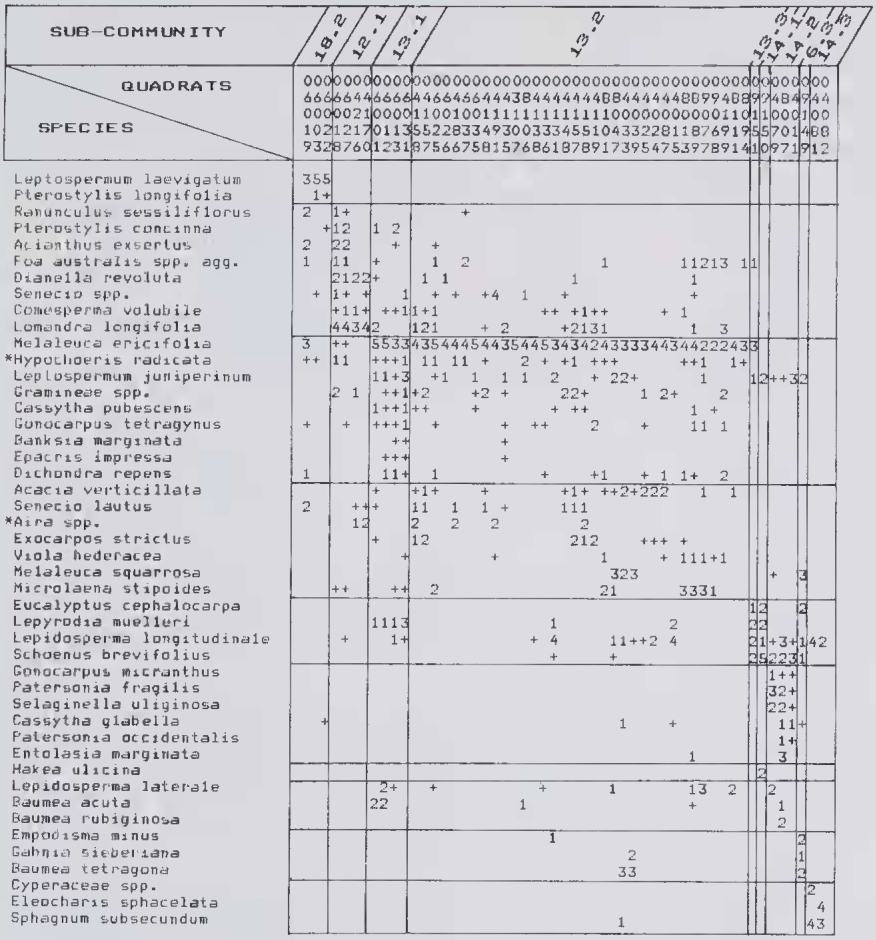


Table 12. Two-way table of sub-community 13.4.

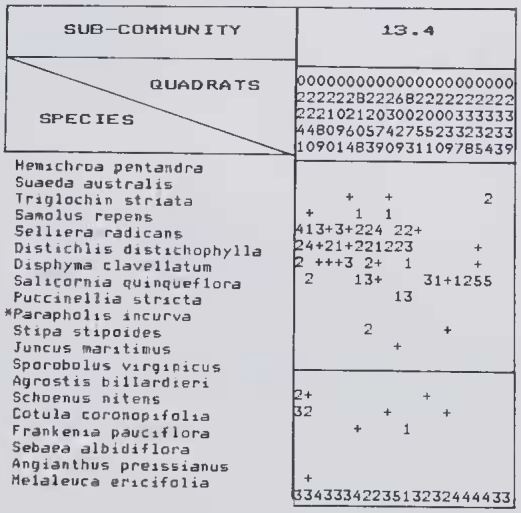


Table 13. Two-way table of Community 15.

SUB-COMMUNITY	15.1	15.2	15.3	15.4	15.5	15.6	U
QUADRATS / SPECIES	000 888 000 243 632	0000000000 8888888888 0000000000 5192530301 4514349960	0000000000 8888888888 0000000000 5666423006 2718593845	000000000000000000000000 444444884488888484484488 000000000100000000000000 063049621013591931066552 881277487326527806104385	00000000000000000000000 44444444444444448444448 00000000010010000000000 54604454707403585078997 55932466205144087705031	00000000000000 44444446664646 11111110001010 56666650116070 43267807405918	000000000000000 444444444484484 000001100000000 793360015825860 727801208920029
Schoenus latelaminatus	+ +						
Selliera radicans	1+						3
Hakea nodosa	11			2 2 ++			
Olearia ramulosa	1+		+		+		+
*Cicendia filiformis	11						
Gahnia trifida	+2						
Mitrasacme paradoxa	1++		+				
*Leontodon taraxacoides	++		+				
Baumea juncea	222		+		2		43
Stylidium despectum	+1	+ +	+ +				
Deyeuxia quadriseta	11+	1 +	+1	1		+ + 1 +	+
Aphelia gracilis	++	+					
Stylidium beaugleholei	++	++++	2				
Boronia parviflora	11+	1 ++	+ 111	1 + + 1 +++	2 +		1+
Centrolepis aristata	+++	1 ++1+	+ +1		+		
Goodenia humilis	11+	1 +111	+1 1 1	2 +2 +	++ + 1 1	1 1	1 1
Danthonia setacea	121	+1 2 2	21+1 1	2 +		2	1
Microlaena stipoides	1	+ 11 ++1	1 213 1+	+		+ + 1	
Opercularia varia	+	+++11 +	++++1++1 +	+ + + 1	+ +	+ + +	
Caesia parviflora	+ +	+11+1 + +	+1 ++ +11+	+			
Slypandra caespitosa	+	1++1+122 +	++1+21+2	1 1			
Xanthosia pusilla		+1+1211++1	++1+ + + 1	++ +	1		+
Drosera pygmaea	11+	1+1+11111	+ ++ 111	+	+ + 1 +	+	+ 1
Casuarina pusilla	+12	3321211112	1313+2+113	3 31 11	4		3
Gonocarpus micranthus	+	+ 1 11	+++1 2 1	1 1 + 1 22	2		
Patersonia fragilis	1	+ 1 1	12 22222	1 21 + 2	+	+22	3 2
Schoenus apogon	21	11 +112+	+1 1+	+	+		2
Entolasia marginata	112	212 111333	1 3 + +	3			
Viola sieberana	+	+1+11+ 11	+ +	+ + + + +	+ + 2+ +	1 + +	+ 1 +
Thysanotus tuberosus	+ 1	+ 11+1 1 +	1 + +	+			
Stipa hemipogon		122 121 1	+ +2	1			
Chamaescilla corymbosa		11+ 1111	1	1		11 +	
Hibbertia stricta	+	1 +21111+1			2 1 2 2	1 222 +211+1 1	
Lepidosperma neesii		3221322232		22 1	1	423 4 3522	
Xanthosia dissecta		+ +1	++1+ + 1	+ + + + + ++ +	++ + 2+ 1	1	+
Schoenus tenuissimus		1 1 1	22 1++2222	432 21211 1 3 13	+	13	
Melaleuca squarrosa			21211	32332+44++ 2+++33+23 2 +	3 + 3 +		444 + 3+
Empodisma minus			1111 121	33342222222212 2 3222 1	1 3 3		2
Selaginella uliginosa	1	+	11 2222	312432113+121112212 1	2 2 2 2 +		+ 1 1
Epacris obtusifolia			+ 121	232321121+222 311 +21	+		+
Sprengelia incarnata			++++	133231223 + 1 2 3	+		

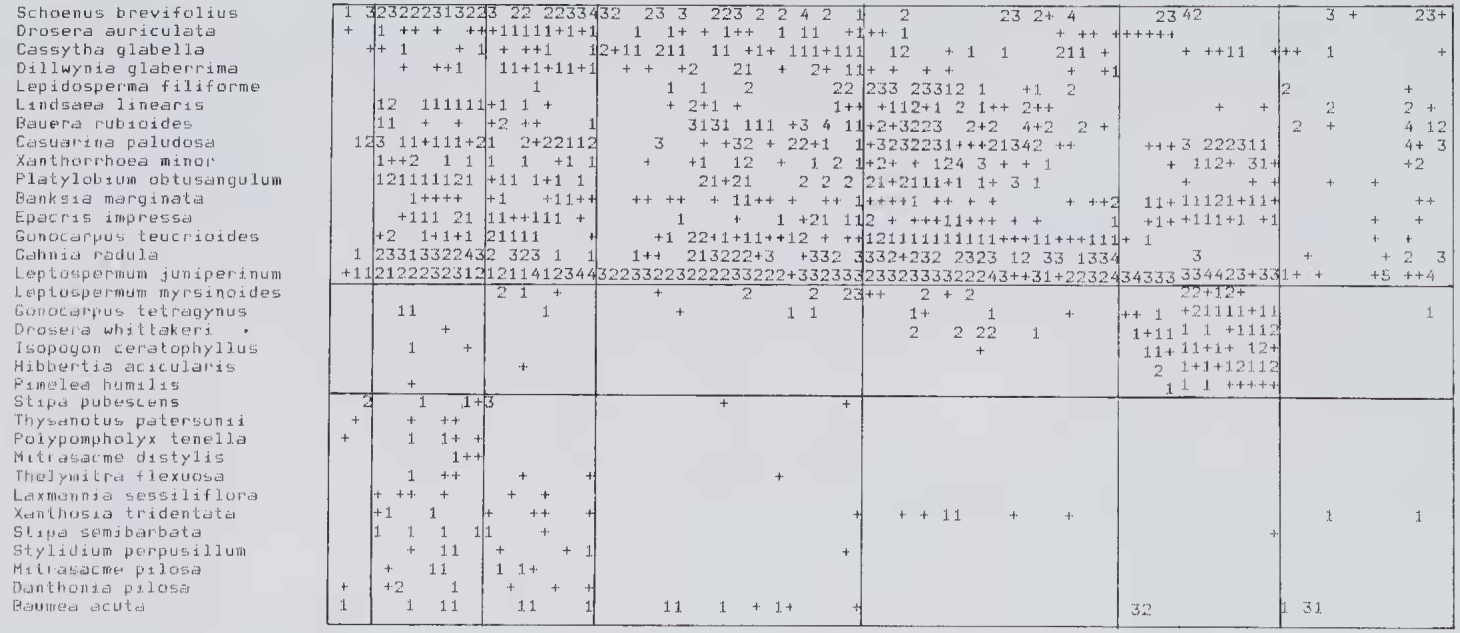

Schoenus brevifolius
Drosera auriculata
Cassytha glabella
Dillwynia glaberrima
Lepidosperma filiforme
Lindsaea linearis
Baueria rubioides
Casuarina paludosa
Xanthorrhoea minor
Platylobium obtusangulum
Banksia marginata
Epacris impressa
Gonocarpus teucrioides
Gahnia radula
Leptospermum juniperinum
Leptospermum myrsinoides
Gonocarpus tetragynus
Drosera whittakeri
Isopogon ceratophyllus
Hibbertia acicularis
Pimelea humilis
Stipa pubescens
Thysanotus patersonii
Polypompholyx tenella
Mitrasacme distylis
Thelymitra flexuosa
Laxmannia sessiliflora
Xanthosia tridentata
Stipa semibarbata
Stylidium perpusillum
Mitrasacme pilosa
Danthonia pilosa
Baumea acuta

Table 14. Two-way table of Communities 16, 17, 18:18.1, 19 and 20.

SUB-COMMUNITY	16.1	17.1	18.1	19.1	20.1	U
QUADRATS	000	00000	0000000000000000000000	000000	00	0000
	998	98899	9444444944934444444844	433433	99	4988
	001	01100	0111221011011122201111	111111	00	2011
	982	92299	9110330900921133320111	122199	99	3922
SPECIES	093	11463	2357796898574185605820	754689	94	3720
Cardamine debilis	11	+				
*Polycarpon tetraphyllum	++		+ +			
Swainsonia lessertiifolia	11					
Caryophyllaceae spp.	11					
Compositae spp.	++	+				
*Ammophila arenaria	212				2	
Spinifex hirsutus	21					
Olearia axillaris	321	+ +	1		+	
Senecio spp.	+++		12 1 +		+	
Helichrysum paralium	131	11				
Calocephalus brownii	12	2 11				
*Holcus lanatus	1	1+++	+		2	+ 1
Poa poiformis	2+	+5352	1 + 2 3			+2 2
Acaena anserinifolia	+	+1+11	1 2 2	++		
Dianella revoluta	1+	11 11	1 + 1 + +	1	1	11
Scirpus nodosus	22+	12121	11 ++ + + + + 211	+21		
Clematis microphylla	+	1 3	11 +11111+1+ 11 ++1	+1 + +	++	++ 1
Dichondra repens	+	++ +	+ 12+122++ 1 21 1	+1	+	+
Leucopogon parviflorus	++	1 +	122++323+1233+1+ 243	+32311	+1	1
Senecio lautus	+1	1 +1	1+21+1 + 11 12	1+		++
Tetragonia implexicoma	3 +	4 ++	1 2 1+		12	22
Tetragonia tetragonioides			+1 2 21 + 2 3			
Daucus glochidiatus	1++		+1+11++ 21 12	1	+	
Rhagodia baccata	111		1 +++2+321+ +2		12	+31
Correa alba		1	2 +++ + 1 2 3 1 +			
*Asparagus asparagoides			++ +1 242 4		1	+
Lophocolea semiteres			11 2+ + 21+ 2+1 11	1		
Leptospermum laevigatum	3	+	34332334243454+33344+3	+	11	31
Banksia integrifolia	1	+	23312233	42+ 1+		+
Pteridium esculentum		5	2+	155 15		+2
Eucalyptus viminalis				1222		
Melaleuca lanceolata					33	
*Ehrharta longiflora					13	
Parietaria debilis		1	+		11	
*Sonchus oleraceus	1	1++	1 ++ + +		11	+
*Stellaria media	+	1 +	+ 1		+1	+1
Bursaria spinosa		1 1	1 + +++ 1	+		2
Casuarina stricta			2+			33
Myoporum insulare		1 +	2 + 22 +			+2
Acacia longifolia	2		12 ++ + 2	1	1	
Poa australis spp. agg.			+ 1	11	+	
Oxalis corniculata	+	1+1	+	++		+
*Hypochoeris radicata	+ +	11+	1 1	++	+	1 +
Melaleuca ericifolia		1				345
*Cerastium glomeratum			11+1 + 2		+	
Crassula macrantha	++		2 + + 21	1		
Crassula sieberiana	+ +	1	+21 ++ 2	1	+	
Geranium spp.		+ 1+	+ 1		+	
Lepidosperma gladiatum		+ 3	2 21 1 21	+		
Pomaderris multiflora			2 3 ++			2

COOL TEMPERATE RAINFOREST : SUB-COMMUNITY WPC 1.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Blechnum wattsii	100	2	Todea barbara	89	1	Australina muelleri	56	1
Dicksonia antarctica	100	3	Hedycarya angustifolia	67	1	Carex appressa	56	1
Nothofagus cunninghamii	100	2	Hymenophyllum australe	67	1	Parsonsia brownii	56	+
Atherosperma moschatum	89	1	Eucalyptus regnans	67	1	Pomaderris aspera	56	1
Grammitis billardieri	89	1	Polyphlebium venosum	67	1	Tetrarrhena juncea	56	1
Blechnum nudum	89	2	Rumohra adiantiformis	67	1			

NO. OF SITES: 9 (0.88% of total)

DISTRIBUTION: Restricted to the far north-east of the Study Area along the ranges north-east of Mt. Beenak.

ENVIRONMENT: Protected, high-altitude, gullies in the Study Area. Median annual rainfall is 1300-1400 mm.

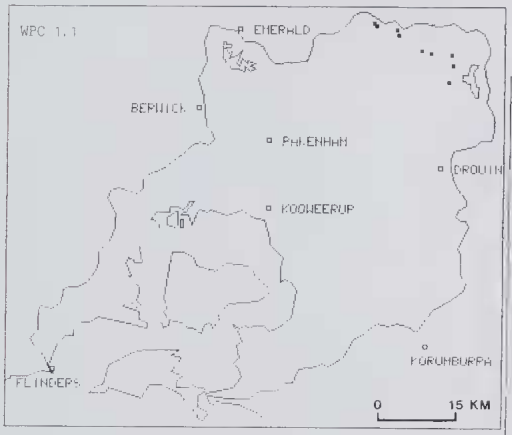
ALTITUDE: Mean = 468 m, Highest = 790 m, Lowest = 228 m.

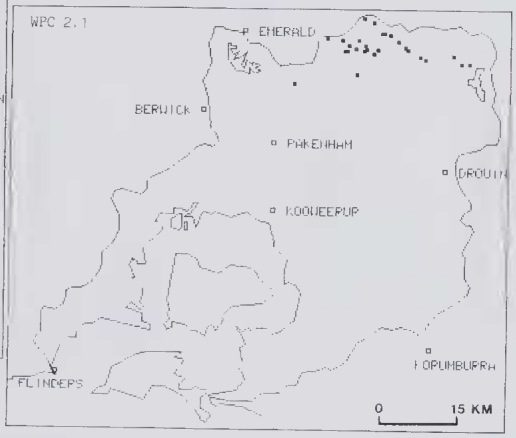
STRUCTURE: Tall woodland

MEAN FLORISTIC RICHNESS: 26 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: This sub-community represents what is commonly known as "fern gully" (Patton, 1933) and is a southern extension of community UYH 6 Gullan *et al.* (1979), the Cool Temperate Rainforest of the Central Highlands. It is characterised by a variety of pteridophytes, including tree ferns and epiphytic ferns, and is dominated by *Nothofagus cunninghamii* (Antarctic Beech), Victoria's only representative of the Fagaceae.

In WPC 1.1, however, *N. cunninghamii* seldom grows as large as it does in the wetter and better developed Cool Temperate Rainforest elsewhere in Victoria. Similarly this vegetation only forms a narrow band (100-300 m wide) along creeks and as a consequence is extremely vulnerable to disturbance (e.g. logging, roading) of the surrounding vegetation.





WET SCLEROPHYLL FOREST : SUB COMMUNITY WPC 2.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Pomaderris aspera	100	1	Tetrarrhena juncea	81	1	Todea barbara	52	1
Clematis aristata	96	1	Australina muelleri	70	1	Fieldia australis	48	1
Alsophila australis	93	2	Histiopteris incisa	67	+	Rumohra adiantiformis	48	1
Dicksonia antarctica	93	3	Eucalyptus regnans	63	2	Bedfordia arborescens	48	1
Acacia dealbata	85	1	Viola hederacea	63	+	Lepidosperma elatius	48	1
Hedycarya angustifolia	85	1	Polystichum proliferum	59	1	Acacia melanoxylon	48	1
Blechnum wattsii	85	2	Blechnum nudum	59	2			
Coprosma quadrifida	81	1	Carex appressa	56	+			

NO. OF SITES: 27 (2.65% of total)

DISTRIBUTION: Occurring in the ranges in the far north of the Study Area - Blue Range and the range north-east of Mt. Beenak.

ENVIRONMENT: Protected high altitude gullies in the Study Area. Median annual rainfall is 1300-1400 mm.

ALTITUDE: Mean = 366 m, Highest = 695 m, Lowest = 130 m.

STRUCTURE: Tall woodland

MEAN FLORISTIC RICHNESS: 28 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: This sub-community contains two types of vegetation which, although visually distinct at their extremes, grade into each other. Both require a constant source of water but in different forms. At one extreme is the fern gully vegetation, dominated by the tree ferns *Dicksonia antarctica* and *Alsophila australis*, which occurs around free flowing water. At the other extreme tall stands of *Melaleuca squarrosa*, with *Todea barbara* as the dominant understorey species, occur on swampy flats which have poorly-drained, water-logged soils. Most sites were intermediate between the two extremes.

Fieldia australis, a character species of this sub-community, is the only species of epiphytic dicotyledon native to Victoria.

WET SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 2.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Coprosma quadrifida	96	1	Viola hederacea	88	1	Pandorea pandorana	65	1
Pomaderris aspera	96	2	Clematis aristata	88	1	Acacia dealbata	65	2
Alsophila australis	92	2	Sambucus gaudichaudiana	81	+	Hydrocotyle geraniifolia	62	+
Eucalyptus cypellocarpa	92	1	Pteridium esculentum	81	1	Olearia lirata	62	1
Tetrarrhena juncea	92	1	Dicksonia antarctica	77	1	Blechnum cartilag.neum	64	2
Polystichum proliferum	92	1	Bedfordia arborescens	73	1	Eucalyptus obliqua	54	2
Australina muelleri	88	1	Olearia argophylla	73	1	Goodenia ovata	50	1
Hedycarya angustifolia	88	1	Oxalis corniculata	69	+			
Lepidosperma elatius	88	1	Acacia melanoxylon	65	1			

NO. OF SITES: 27 (2.65% of total)

DISTRIBUTION: Restricted to the northern slopes of the Mt. Towt range, Black Snake Range and Blue Range with several occurrences near the northern shores of Cardinia Reservoir.

ENVIRONMENT: Intermediate altitude protected slopes. Median annual rainfall is 1100-1400 mm.

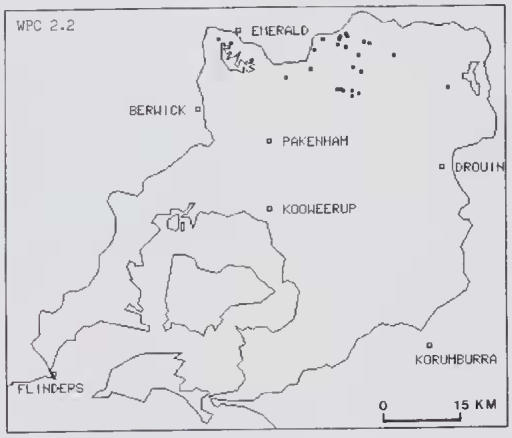
ALTITUDE: Mean = 307 m, Highest = 530 m, Lowest = 100 m.

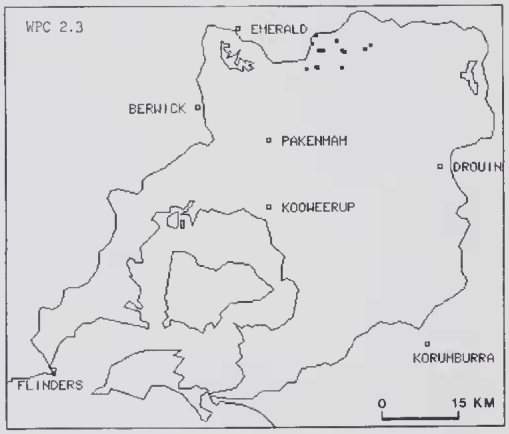
STRUCTURE: Tall open-forest to Tall woodland

MEAN FLORISTIC RICHNESS: 34 species per site. MEAN WEED COMPOSITION: 3% of species, 2% of cover.

NOTES: This sub-community represents a typical mixed eucalypt Wet Sclerophyll Forest in close proximity to a fern gully. Many of the sites contain very large tree ferns (both *Dicksonia* and *Alsophila*) - 568 m tall and up to 0.5 m diameter. Logging (both recent and long past) was evident at or very nearby a number of sites and at some sites the eucalypt canopy was quite poor.

WPC 2.2 has affinities with SL 4a (Gullan *et al.* 1979).





WET SCLEROPHYLL FOREST :SUB-COMMUNITY WPC 2.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Coprosma quadrifida	100	1	Goodenia ovata	93	1	Blechnum cartilagineum	71	1
Alsophila australis	100	1	Oxalis corniculata	86	+	Geranium potentilloides	64	+
Lepidosperma elatius	100	1	Viola hederacea	86	1	Gonocarpus teucrioides	64	1
Pteridium esculentum	100	2	Acacia verticillata	86	1	Olearia lirata	64	1
Tetrarrhena juncea	100	2	Bedfordia arborescens	79	1	Pandorea pandorana	64	1
Clematis aristata	93	1	Eucalyptus cypellocarpa	79	1	Spyridium parvifolium	57	1
Eucalyptus obliqua	93	2	Pomaderris aspera	71	1			

NO. OF SITES: 14 (1.37% of total)

DISTRIBUTION: Occurring at the western end of the Blue Range and Black Snake Range.

ENVIRONMENT: Intermediate altitude protected slopes. Median annual rainfall is 1200-1400 mm.

ALTITUDE: Mean = 262 m, Highest = 380 m, Lowest = 120 m.

STRUCTURE: Woodland

MEAN FLORISTIC RICHNESS: 32 species per site. MEAN WEED COMPOSITION: 3% of species, 1% of cover.

NOTES: A lower altitude, and consequently drier version of WPC 2.2. This is indicated by the absence of *Eucalyptus regnans, Dicksonia antarctica, Hedycarya angustifolia* and *Australina muelleri* and the presence of *Spyridium parvifolium* and *Acacia verticillata*. Most sites have been logged in the past, with the main sawlog species being *E. obliqua* and *E. cypellocarpa*, and in some of these sites the ground layer is very disturbed and dominated by *Pteridium esculentum* and *Tetrarrhena juncea*.

WPC 2.3 has affinities with SL 4b (Gullan *et al.* 1979).

WET SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 2.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Tetrarrhena juncea	100	2	Olearia lirata	80	1	Pimelea axiflora	56	1
Alsophila australis	96	1	Eucalyptus cypellocarpa	80	1	Zieria arborescens	52	1
Pteridium esculentum	96	1	Acacia dealbata	72	2	Acacia verticillata	48	1
Pomaderris aspera	96	2	Bedfordia arborescens	68	1	Olearia argophylla	48	1
Lepidosperma elatius	88	1	Prostanthera lasianthos	68	1	Hedycarya angustifolia	48	+
Viola hederacea	88	1	Eucalyptus regnans	64	2	Acacia obliquinervia	48	1
Clematis aristata	84	1	Coprosma quadrifida	60	1			
Goodenia ovata	84	1	Eucalyptus obliqua	60	2			

NO. OF SITES: 25 (2.45% of total)

DISTRIBUTION: Apart from two southerly occurrences, restricted to the north of the Study Area on the Blue Range and around Rysons Creek.

ENVIRONMENT: Higher altitude protected slopes. Median annual rainfall is 1200-1400 mm.

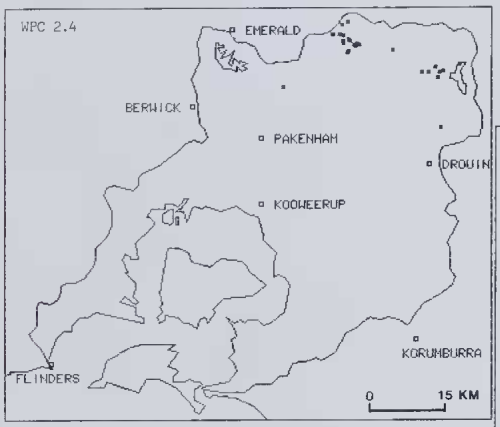
ALTITUDE: Mean = 383 m, Highest = 600 m, Lowest = 110 m.

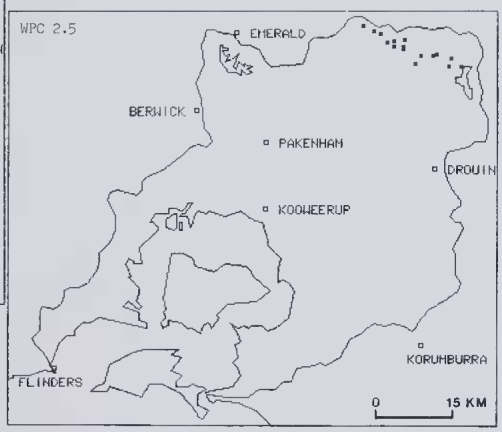
STRUCTURE: Tall open-forest

MEAN FLORISTIC RICHNESS: 27 species per site. MEAN WEED COMPOSITION: 1% of species, 1% of cover.

NOTES: This sub-community has affinities with UYH 8 (Gullan *et al.* 1979) but its lower altitude is less suitable for *Eucalyptus regnans* therefore, in contrast to UYH 8, which is almost purely *E. regnans*, WPC 2.4 is a mixed forest of *E. obliqua*, *E. cypellocarpa* and *E. regnans*.

Most sites have a high cover of *Tetrarrhena juncea* and a disturbed ground layer and show evidence of logging in the past.





WET SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 2.5

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Acacia obliquinervia	94	1	Zieria arborescens	75	1	Viola hederacea	56	+
Polyscias sambucifolius	88	1	Pteridium esculentum	75	1	Eucalyptus obliqua	56	1
Tetrarrhena juncea	88	3	Blechnum wattsii	69	1	Platylobium formosum	56	1
Eucalyptus regnans	81	2	Correa lawrenciana	63	2	Pomaderris aspera	56	2
Alsophila australis	81	1	Gahnia sieberiana	63	1	Prostanthera lasianthos	56	1
Phebalium bilobum	81	1	Acacia dealbata	63	1			

NO. OF SITES: 16 (1.57% of total)

DISTRIBUTION: Restricted to the ranges in the far north of the Study Area, north-east of Mt. Beenak.

ENVIRONMENT: Highest altitude protected slopes. Median annual rainfall is greater than 1300 mm.

ALTITUDE: Mean = 488 m, Highest = 760 m, Lowest = 198 m.

STRUCTURE: Tall open-forest

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: A higher altitude version of WPC 2.4 in which the following species *Correa lawrenciana, Phebalium bilobum, Polyscias sambucifolius, Zieria arborescens, Prostanthera lasianthos* and *Acacia obliquinervia* are more common.

In many of the sites *Tetrarrhena juncea* forms a tangled and sometimes impenetrable ground layer.

This sub-community also has affinities with the higher altitude UYH 8 (Gullan *et al.* 1979).

RIPARIAN FOREST : SUB-COMMUNITY WPC 3.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Alsophila australis	96	1	Acacia melanoxylon	71	1	Goodenia ovata	58	1
Melaleuca squarrosa	92	3	Blechnum minus	71	1	Leptospermum juniperinum	54	1
Blechnum nudum	88	2	Dicksonia antarctica	67	1	Pomaderris aspera	54	1
Tetrarrhena juncea	88	1	Poa tenera	67	1	Viola hederacea	54	1
Carex appressa	79	1	Lepidosperma laterale	63	1	Eucalyptus cypellocarpa	50	1
Gleichenia microphylla	75	2	Coprosma quadrifida	58	1	Blechnum wattsii	50	1
Gahnia sieberiana	75	1	Eucalyptus obliqua	58	1	Olearia lirata	50	1

NO. OF SITES: 24 (2.36% of total)

DISTRIBUTION: Occurring in the ranges in the north of the Study Area.

ENVIRONMENT: Sheltered boggy depressions or close to creeks and rivers in the foothills to the north of the Study Area. Median annual rainfall is 1100-1300 mm.

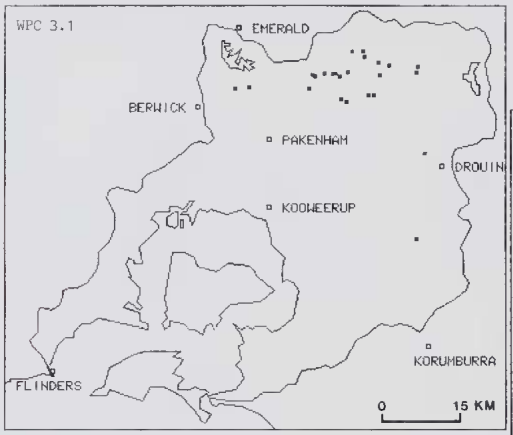
ALTITUDE: Mean = 137 m, Highest = 245 m, Lowest = 85 m.

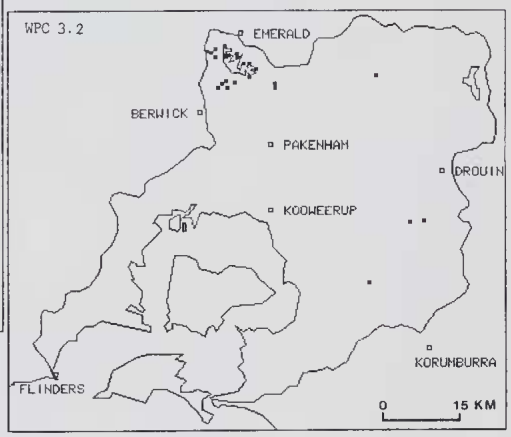
STRUCTURE: Closed-forest to low woodland

MEAN FLORISTIC RICHNESS: 32 species per site. MEAN WEED COMPOSITION: 4% of species, 3% of cover.

NOTES: This riparian sub-community is characterised by a number of species which are typical of swampy ground e.g. *Carex appressa, Gahnia sieberiana* and *Gleichenia microphylla*.

It has floristic affinities with Wet Sclerophyll Forest (Community 2) and also with WPC 3.2 which is found on less swampy creeks.





RIPARIAN FOREST : SUB-COMMUNITY WPC 3.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Tetrarrhena juncea	96	1	Cassinia aculeata	69	1	Hydrocotyle hirta	58	+
Pteridium esculentum	88	1	Helichrysum dendroideum	69	1	Oxalis corniculata	58	+
Eucalyptus obliqua	85	1	Blechnum nudum	69	1	Viola hederacea	58	+
Goodenia ovata	81	1	Lepidosperma laterale	65	1	Eucalyptus ovata	58	1
Acacia verticillata	81	1	Gonocarpus tetragynus	65	1	Gahnia radula	50	1
Acaena anserinifolia	77	1	Gahnia sieberiana	65	1	Blechnum minus	50	1
Leptospermum juniperinum	73	1	Poa tenera	65	1	Culcita dubia	50	1
Rubus fruticosus spp. agg.	73	1	Alsophila australis	65	1	Acacia melanoxylon	50	1
Poa australis spp. agg.	69	1	Carex appressa	62	1			

NO. OF SITES: 26 (2.6% of total)

DISTRIBUTION: Restricted to the low hills in the north-west of the Study Area in the vicinity of Cardinia Reservoir, with a few scattered occurrences in the hills to the east.

ENVIRONMENT: Sheltered lowland gullies or broad shallow rivers which may be silted up to some extent to produce a swampy or very slowly flowing body of water. Median annual rainfall 1000-1100 mm.

ALTITUDE: Mean = 164 m, Highest = 260 m, Lowest = 100 m.

STRUCTURE: Low open-forest to woodland

MEAN FLORISTIC RICHNESS: 42 species per site. MEAN WEED COMPOSITION: 10% of species, 8% of cover.

NOTES: This sub-community, along with WPC 4.1, has the highest values for mean weed composition of all sub-communities north of the Princes Highway. This is a result of its close association with farming activities. The slow moving water bodies of these sites act as sinks for weeds, e.g. *Holcus lanatus* and *Rubus fruticosus* which are carried by water draining directly off farmland near the site and by water carried downstream from farms or picnic areas further away.

Most trees in this sub-community are young.

RIPARIAN FOREST : SUB-COMMUNITY WPC 3.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Acacia melanoxylon	100	1	Rubus parvifolius	86	1	Leptospermum juniperinum	57	1
Acaena anserinifolia	100	1	Scirpus inundatus	71	1	Leptospermum lanigerum	57	3
Carex appressa	100	2	Juncus spp.	71	+	Lobelia alata	57	+
Eucalyptus ovata	100	2	Coprosma quadrifida	71	1	Melaleuca squarrosa	57	1
Poa tenera	100	2	Geranium solanderi	71	1	Polygonum strigosum	57	1
Acacia dealbata	86	1	Phragmites australis	57	2	Dianella tasmanica	57	+
Blechnum nudum	86	1	Gynatrix pulchella	57	+	*Hypochoeris radicata	57	+
Cyperus lucidus	86	2	Hypolepis muelleri	57	1	Lepidosperma laterale	57	2
Gahnia sieberiana	86	1	Alsophila australis	57	+	Pteridium esculentum	57	1
Oxalis corniculata	86	+	Gleichenia microphylla	57	+	Polyscias sambucifolius	57	1
Pomaderris aspera	86	1	Gratiola peruviana	57	1			

NO. OF SITES: 7 (0.69% of total)

DISTRIBUTION: Found along Diamond Creek in the north of the Study Area, with a single occurrence on Back Creek and Labertouche Creek.

ENVIRONMENT: Low altitude flood plains or similarly wet areas. Median annual rainfall is 1200-1300 mm.

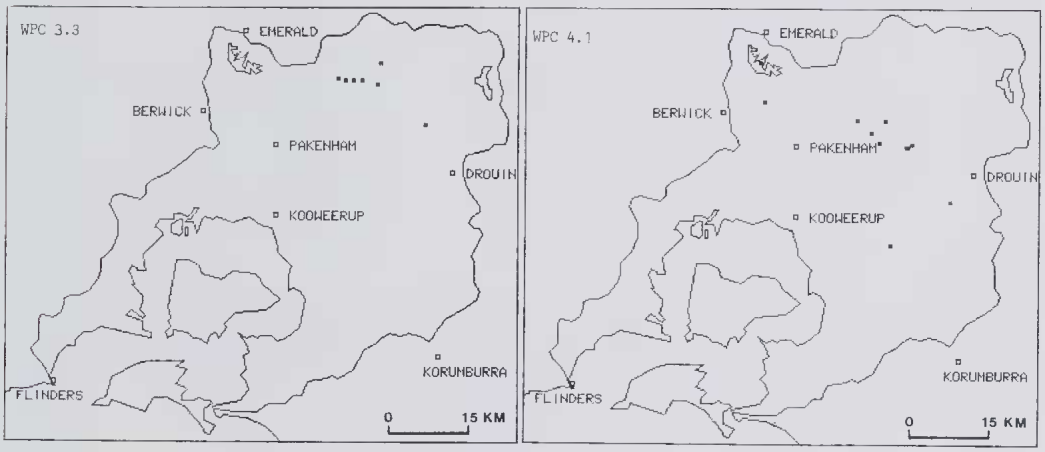
ALTITUDE: Mean = 95 m, Highest = 120 m, Lowest = 60 m.

STRUCTIRE: Tall open-forest to woodland

MEAN FLORISTIC RICHNESS: 36 species per site. MEAN WEED COMPOSITION: 4% of species, 2% of cover.

NOTES: A wide range of plant forms is represented in this sub-community e.g. trees, shrubs, sedges, ferns, grasses, lilies and cryptic and brightly coloured herbs. The majoritiy of these species are small and occupy the ground layer of the vegetation up to 0.5 m.

Gynatrix pulchella, an uncommon riparian shrub, is the only member of the Malvaceae represented in the Study Area.



DRY SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 4.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Glycine clandestina	91	1	Epacris impressa	73	1	Eucalyptus obliqua	64	2
Pteridium esculentum	91	1	Lomandra filiformis	64	1	Eucalyptus radiata	64	2
Viola hederacea	91	1	Acacia stricta	64	1	Hypochoeris radicata	64	1
Microlaena stipoides	82	1	Lomandra longifolia	64	1	Eucalyptus globoidea	55	2
Senecio quadridentatus	82	1	Acianthus exsertus	64	1	Goodenia lanata	55	1
Lagenifera stipitata	73	1	Dichondra repens	64	1	Imperata cylindrica	55	1
Acrotriche prostrata	73	1	Oxalis corniculata	64	1	Lepidosperma laterale	55	+
Adiantum aethiopicum	73	1	Clematis aristata	64	+	Themeda australis	55	2
Poa australis spp. agg.	73	1	Deyeuxia quadriseta	64	1	Pterostylis longifolia	55	+
Gonocarpus tetragynus	73	1	Drosera peltata	64	+	Tetrarrhena juncea	55	2
Cassinia aculeata	73	1						

NO. OF SITES: 11 (1.1% of total)

DISTRIBUTION: Scattered throughout the centre of the Study Area with a small concentration near Garfield and Bunyip.

ENVIRONMENT: Lower altitude dry slopes supporting deep loamy soils, occaisionally with rocky outcrops. Median annual rainfall 900-1100 mm.

ALTITUDE: Mean = 105 m, Highest = 200 m, Lowest = 50 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 43 species per site. MEAN WEED COMPOSITION: 1% of species, 8% of cover.

NOTES: This sub-community is characterised by a high diversity of types of ground layer species (e.g. climbers, grasses, lilies and herbs) and an abundance of herbs. All sites have been disturbed (grazing, fires, rubbish dumping) WPC 4.1, along with WPC 3.3, has the highest values for mean weed composition of all sub-communities north of the Princes Highway.

Eucalyptus globoidea forms an interesting and localised component of this sub-community. WPC 4.1 is the only sub-community in which *E. globoidea* is a character species and represents the western extremity of this species' range.

DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Tetrarrhena juncea	100	1	Culcita dubia	73	2	Lagenifera stipitata	60	+
Viola hederacea	100	1	Cassinia aculeata	67	1	Blechnum cartilagineum	60	2
Goodenia ovata	93	1	Billardiera scandens	67	+	Centaurium pulchellum	60	+
Poa australis spp. agg.	87	1	Acacia verticillata	67	1	Platylobium formosum	60	1
Pteridium esculentum	87	2	Gahnia radula	67	1	Acrotriche prostrata	53	1
Eucalyptus obliqua	80	2	Helichrysum dendroideum	67	1	Alsophila australis	53	1
Clematis aristata	80	+	Hypochoeris radicata	67	1	Glycine clandestina	53	1
Gonocarpus tetragynus	73	1	Eucalyptus radiata	60	1	Lomandra longifolia	53	+
Leptospermum juniperinum	73	1						

NO. OF SITES: 15 (1.5% of total)

DISTRIBUTION: Contained within a band which stretches east-west across the Study Area and is bounded by the Cardinia Reservoir in the north and the Princes Highway in the south. Most sites are in an area south-west of Tonimbuk but another group is clustered near Officer.

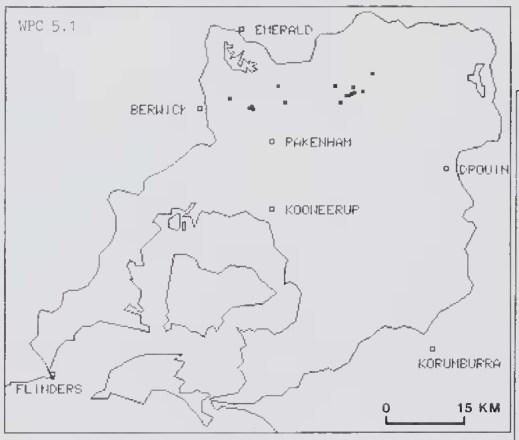
ENVIRONMENT: Riverside slopes and drainage lines in the Damp Sclerophyll Forest of the lowland hills. Median annual rainfall is 90-1200 mm.

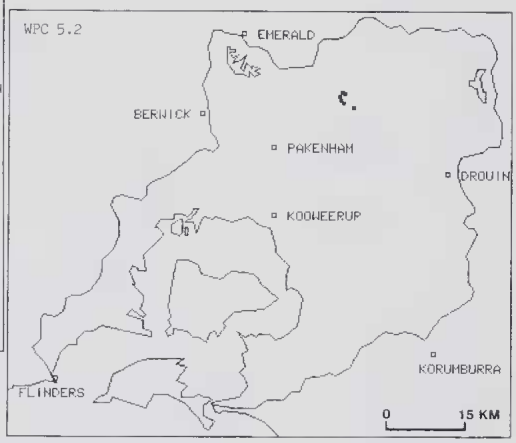
ALTITUDE: Mean = 228 m, Highest = 400 m, Lowest = 100 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 36 species per site. MEAN WEED COMPOSITION: 6% of species, 5% of cover.

NOTES: Most sites in this sub-community are close to farming areas and consequently support a large number of native species which are considered indicative of disturbances from either road-making, clearing or burning as well as introduced weeds.





DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	100	1	Helichrysum dendroideum	83	+	Danthonia pilosa	67	1
Leptospermum juniperinum	100	1	Pteridium esculentum	83	1	Lagenifera stipitata	67	1
Poa australis spp. agg.	100	1	Acrotriche prostrata	83	1	Correa reflexa	67	+
Tetrarrhena juncea	100	1	Amperea xiphoclada	83	1	Eucalyptus dives	67	1
Viola hederacea	100	1	Billardiera scandens	83	+	Eucalyptus radiata	67	1
Hypochoeris radicata	100	+	Eucalyptus cypellocarpa	83	1	Gahnia radula	67	1
Eucalyptus obliqua	83	1	Eucalyptus sieberi	83	2	Lomandra longifolia	67	1
Goodenia lanata	83	1	Gnaphalium japonicum	83	+	Pultenaea scabra	67	1
Gonocarpus tetragynus	83	1						

NO. OF SITES: 6 (0.6% of total)

DISTRIBUTION: Restricted to the hills west of Mt. Towt.

ENVIRONMENT: Exposed to cold south-westerly winds. Median annual rainfall is 1100-1200 mm.

ALTITUDE: Mean = 260 m, Highest = 310 m, Lowest = 200 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 35 species per site. MEAN WEED COMPOSITION: 4% of species, 3% of cover.

NOTES: This sub-community has affinities with the wetter end of the Damp Sclerophyll Forest Community gradient (viz. the occurrence of *Eucalyptus cypellocarpa* and *Helichrysum dendroideum*) and with the Sclerophyll Woodland Community (viz. the occurrence of *Danthonia pilosa*, *Stipa muelleri* and *Lomatia ilicifolia*). The latter occurs at a lower altitude (appproximately 160 m).

WPC 5.2 is characterised by five species of *Eucalyptus*. This is more than any other sub-community in the Study Area.

DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Spyridium parvifolium	96	2	Viola hederacea	83	+	Cassinia aculeata	61	1
Eucalyptus obliqua	96	2	Eucalyptus sieberi	74	1	Clematis aristata	57	1
Tetrarrhena juncea	96	2	Correa reflexa	74	1	Gonocarpus teucrioides	52	+
Goodenia ovata	91	1	Eucalyptus cypellocarpa	74	1	Olearia rugosa	52	1
Pteridium esculentum	91	1	Alsophila australis	70	+	Billardiera scandens	52	+
Lepidosperma elatius	87	1	Bedfordia arborescens	65	1	Olearia lirata	52	1
Platylobium formosum	87	1	Banksia spinulosa	65	1	Pultenaea scabra	52	1
Acacia verticillata	83	1	Eucalyptus baxteri	61	1			

NO. OF SITES: 23 (2.3% of total)

DISTRIBUTION: Mostly on the western end of the ranges in the north of the Study Area, in particular the Black Snake Range.

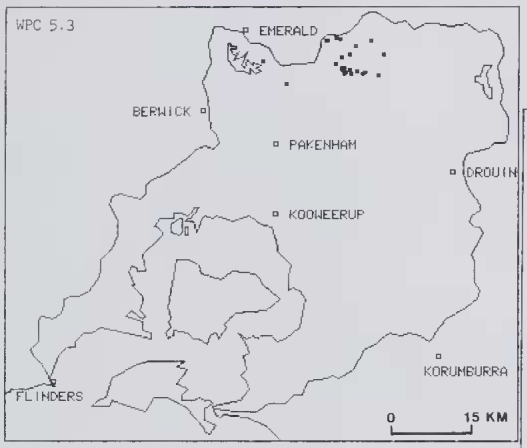
ENVIRONMENT: Sheltered slopes protected from drying winds. Median annual rainfall is 1200-1300 mm.

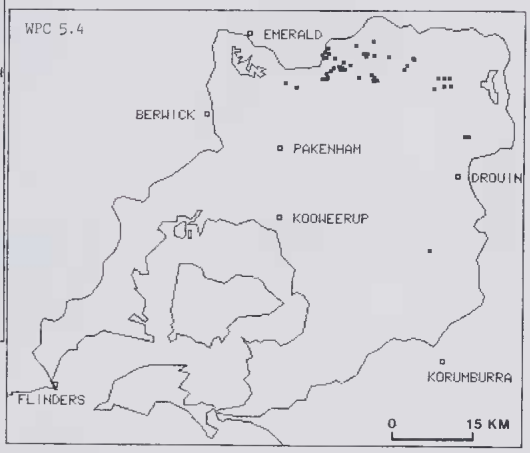
ALTITUDE: Mean = 298 m, Highest = 470 m, Lowest = 120 m.

STRUCTURE: Woodland to open-forest

MEAN FLORISTIC RICHNESS: 27 species per site. MEAN WEED COMPOSITION: 1% of species, 0% of cover.

NOTES: The presence of *Eucalyptus cypellocarpa*, *Bedfordia arborescens* and *Alsophila australis* indicate that this sub-community is a wetter variant of the Damp Sclerophyll Forest Community. The understorey is often a tangled mass of *Spyridium parvifolium*, *Lepidosperma elatius* and *Pteridium esculentum* bound together by *Tetrarrhena juncea*. Large granite rocks are frequently a dominant feature of the site.





DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Tetrarrhena juncea	96	2	Tetratheca stenocarpa	72	1	Gahnia radula	46	1
Pteridium esculentum	96	1	Eucalyptus obliqua	70	1	Bauera rubioides	46	1
Amperea xiphoclada	93	1	Platylobium formosum	70	1	Pultenaea scabra	43	1
Eucalyptus sieberi	93	2	Leptospermum juniperinum	59	1	Banksia spinulosa	43	1
Spyridium parvifolium	91	2	Billardiera scandens	54	+	Lomatia ilicifolia	39	1
Eucalyptus baxteri	78	2	Pultenaea mollis	52	2	Dampiera stricta	39	+
Correa reflexa	76	1	Lepidosperma elatius	48	1	Olearia rugosa	39	+
Goodenia ovata	74	1	Eucalyptus radiata	48	1	Goodenia lanata	39	1
Viola hederacea	72	1	Acacia oxycedrus	46	1			

NO. OF SITES: 46 (4.5% of total)

DISTRIBUTION: Occurring on the northern slopes of the ranges in the north of the Study Area. Most sites are concentrated at the western end of the Blue Range and Black Snake Range.

ENVIRONMENT: Deep, well-drained loamy soils on hillsides or ridges in the intermediate elevations of the Study Area. Median annual rainfall is 1200-1300 mm.

ALTITUDE: Mean = 275 m, Highest = 510 m, Lowest = 100 m.

STRUCTURE: Woodland to open-forest

MEAN FLORISTIC RICHNESS: 25 species per site MEAN WEED COMPOSITION: No weeds.

NOTES: This sub-community is a drier variant of Damp Sclerophyll Forest than WPC 5.3. It lacks *Eucalyptus cypellocarpa* but has an increased abundance and frequency of *E. sieberi* and *E. baxteri*.

DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.5

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Eucalyptus obliqua	100	2	Viola hederacea	100	1	Eucalyptus cypellocarpa	67	1
Lepidosperma elatius	100	1	Acacia obliquinervia	83	1	Olearia rugosa	67	1
Pteridium esculentum	100	1	Eucalyptus sieberi	83	1	Prostanthera lasianthos	67	+
Tetrarrhena juncea	100	3	Goodenia ovata	83	2	Spyridium parvifolium	67	2

NO. OF SITES: 6 (0.6% of total)

DISTRIBUTION: Scattered throughout the ranges in the north of the Study Area.

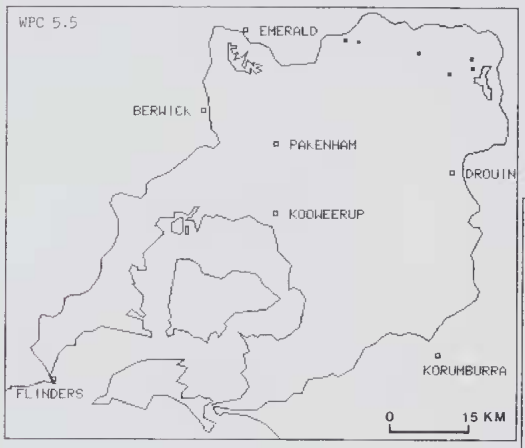
ENVIRONMENT: Well drained hillsides or ridges in the higher elevations of the Study Area. Median annual rainfall is 1200-1300 mm.

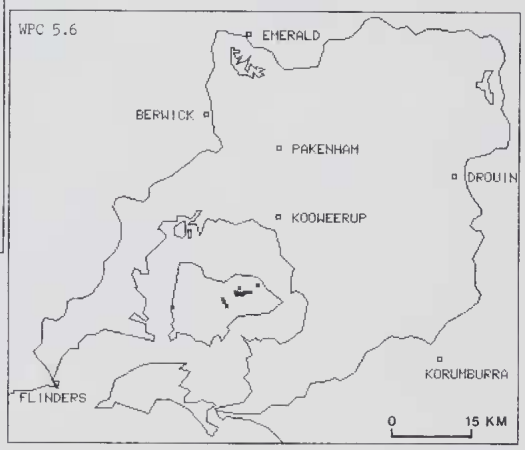
ALTITUDE: Mean = 386 m, Highest = 488 m, Lowest = 228 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: 1% of species, 1% of cover.

NOTES: This is an unusual sub-community. Its closest affinities are with WPC 5.4 however the occurrence of *Acacia obliquinervia*, and to a lesser extent *Prostanthera lasianthos*, which are typical of higher altitude and higher rainfall areas links this sub-community with WPC 2.5.





DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.6

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Acrotriche serrulata	88	1	Tetrarrhena juncea	88	2	Epacris impressa	69	1
Gahnia radula	88	2	Eucalyptus obliqua	81	2	Hakea sericea	63	1
Gonocarpus teucrioides	88	1	Pteridium esculentum	81	1	Acacia myrtifolia	63	1
Platylobium obtusangulum	88	1	Leptospermum juniperinum	81	2	Billardiera scandens	56	1

NO. OF SITES: 16 (1.6% of total)

DISTRIBUTION: Restricted to the north-east of French Island with an isolated occurrence on the west coast.

ENVIRONMENT: Well-drained hillsides. Median annual rainfall is 800-900 mm.

ALTITUDE Mean = 69 m, Highest = 95 m, Lowest = 10 m.

STRUCTURE: Low open-forest

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: This sub-community has affinities with GLC Community 6. sub-community 1 (Gullan *et al.* 1981) but is a floristically poorer and lower altitude version of it. The understorey consists of species usually regarded as indicative of disturbance (e.g. *Gahnia radula, Platylobium obtusangulum, Pteridium esculentum* and *Tetrarrhena juncea*).

DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.7

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Dichelachne micrantha	100	1	Viola hederacea	100	1	Comesperma volubile	67	1
Dichondra repens	100	1	Agropyron scabrum	67	+	Danthonia racemosa	67	1
Eucalyptus obliqua	100	3	*Anagallis arvensis	67	+	Deyeuxia quadriseta	67	1
Glycine clandestina	100	1	Asperula conferta	67	+	Drosera auriculata	67	+
Helichrysum dendroideum	100	+	Hypericum gramineum	67	+	Gahnia radula	67	1
Lagenifera stipitata	100	+	Pandorea pandorana	67	1	Leptospermum juniperinum	67	1
Microlaena stipoides	100	1	Acacia suaveolens	67	1	Lomandra filiformis	67	+
Oxalis corniculata	100	1	Acaena anserinifolia	67	1	Poa australis spp. agg.	67	1
Pteridium esculentum	100	3	Clematis aristata	67	1	Schoenus apogon	67	1

NO. OF SITES: 3 (0.3% of total)

DISTRIBUTION: Isolated occurrences in the south of French Island.

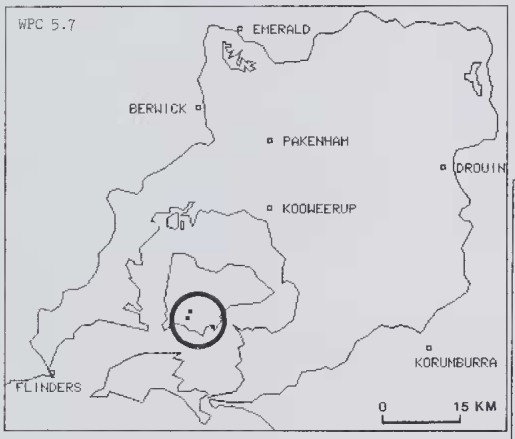
ENVIRONMENT: Well-drained hillsides. Median annual rainfall is less than 800 mm.

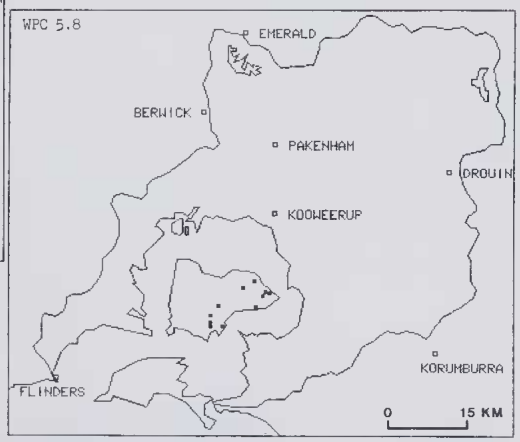
ALTITUDE: Mean = 35 m, Highest = 40 m, Lowest = 25 m.

STRUCTURE: Low open-forest

MEAN FLORISTIC RICHNESS: 38 species per site. MEAN WEED COMPOSITION: 13% of species, 10% of cover.

NOTES: A variant of WPC 5.6 which has a more disturbed and depauperate understorey. The trees (*Eucalyptus obliqua*) have withstood fires in recent years and are amongst the largest of this species on French Island.





DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.8

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gahnia radula	100	1	Viola hederacea	85	1	Drosera auriculata	62	+
Melaleuca ericifolia	92	2	Billardiera scandens	69	1	Eucalyptus obliqua	62	2
Leptospermum juniperinum	85	1	Pteridium esculentum	69	1	Acacia stricta	54	1
Acacia verticillata	85	1	Dichondra repens	62	1	Microlaena stipoides	54	1

NO. OF SITES: 13 (1.3% of total)

DISTRIBUTION: Scattered throughout the east of French Island.

ENVIRONMENT: Poorly drained freshwater swamps on clayey deposits. Median annual rainfall is between 700 and 900 mm.

ALTITUDE: Mean = 36 m, Highest = 80 m, Lowest = 10 m.

STRUCTURE: Woodland to Tall shrubland

MEAN FLORISTIC RICHNESS: 29 species per site. MEAN WEED COMPOSITION: 6% of species, 4% of cover.

NOTES: Damp Sclerophyll Forest in which *Melaleuca ericifolia* has become a dominant component of the understorey.

M. ericifolia may also be associated, in the same way, with a variety of other communities and eventually exclude most of their other constituent species creating a community of its own viz: *Melaleuca ericifolia* scrub.

DAMP SCLEROPHYLL FOREST : SUB-COMMUNITY WPC 5.9

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Pteridium esculentum	100	3	Poa australis spp. agg.	69	1	Acacia verticillata	62	1
Viola hederacea	100	+	Gonocarpus tetragynus	69	1	Tetrarrhena juncea	62	2
Eucalyptus obliqua	92	3	Oxalis corniculata	69	+	Acaena anserinifolia	54	+
*Hypochoeris radicata	85	+	Acacia stricta	62	1	Eucalyptus radiata	54	1
Clematis aristata	69	+	Helichrysum dendroideum	62	1			

NO. OF SITES: 13 (1.3% of total)

DISTRIBUTION: Restricted to the lowland slopes in the south of the Study Area.

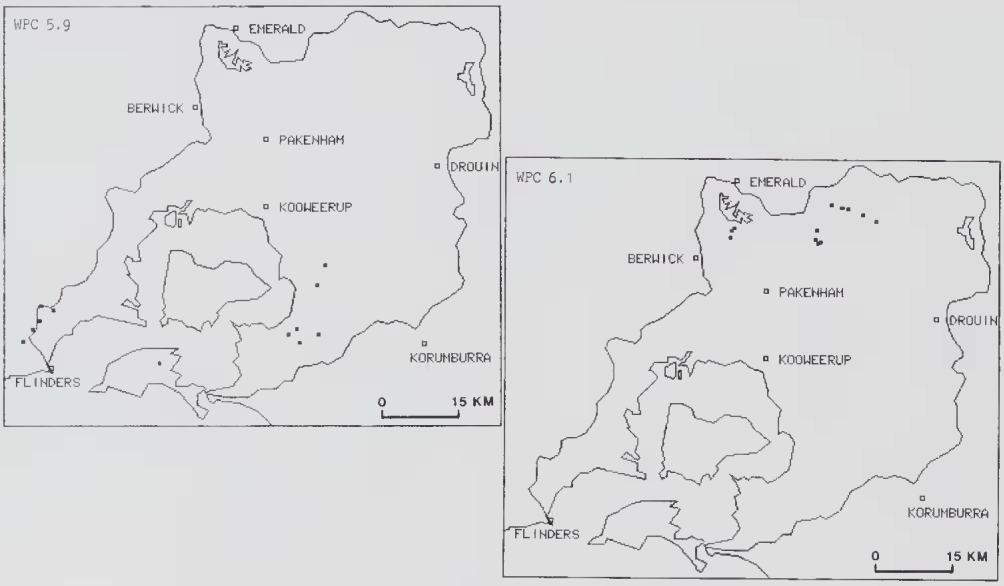
ENVIRONMENT: Clay-loam soils of near-coastal lowland hills. Median annual rainfall is 800-1000 mm.

ALTITUDE: Mean = 100 m, Highest = 170 m, Lowest = 30 m.

STRUCTURE: Open-forest to Low woodland

MEAN FLORISTIC RICHNESS: 30 species per site. MEAN WEED COMPOSITION: 6% of species, 4% of cover.

NOTES: This species-poor sub-community has resulted from heavy clearing, burning and grazing pressures. The affinities of WPC 5.9 are obscured by the dominance of *Pteridium esculentum* in the understorey. It most closely represents intermediate to low altitude Damp Sclerophyll Forest.



WET HEATHLAND : SUB-COMMUNITY WPC 6.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Hakea nodosa	100	1	Leptospermum juniperinum	85	1	Epacris obtusifolia	62	1
Empodisma minus	92	1	Gleichenia dicarpa	77	2	Eucalyptus cephalocarpa	62	1
Leptospermum lanigerum	92	1	Xyris operculata	77	2	Lepidosperma filiforme	62	1
Baumea tetragona	92	1	Gahnia sieberiana	77	1	Baumea rubiginosa	54	1
Sprengelia incarnata	92	1	Tetraria capillaris	69	1	Gonocarpus tetragynus	54	+
Melaleuca squarrosa	92	2	Patersonia fragilis	62	1	Lepidosperma forsythii	54	1

NO. OF SITES: 13 (1.3% of total)

DISTRIBUTION: Associated with three of the river systems in the north of the Study Area: (i) Stony Creek, north of Beaconsfield, (ii) headwaters of Cannibal Creek, north of Mary Knoll, and (iii) tributaries of Back Creek.

ENVIRONMENT: Areas of impeded drainage, usually on sandy-clay soils which are often water-logged. Median annual rainfall is 1000-1300 mm.

ALTITUDE: Mean = 135 m, Highest = 190 m, Lowest = 60 m.

STRUCTURE: Open-scrub to low shrubland

MEAN FLORISTIC RICHNESS: 31 species per site. MEAN WEED COMPOSITION: 2% of species, 2% of cover.

NOTES: The most floristically rich wetland vegetation of the Western Port Catchment. Unlike many other wetlands which are dominated by the Cyperaceae or Myrtaceae, WPC 6.1 supports a range of brightly flowered epacrids, irids and lilies.

Lepidosperma forsythii, an uncommon Victorian sedge, is a character species of this sub-community. It is found nowhere else in the Study Area and its next nearest locality is over 100 km away.

Another character species, *Eucalyptus cephalocarpa*, never has a cover value high enough to warrant classifying the vegetation as a woodland.

WET HEATHLAND : SUB-COMMUNITY WPC 6.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leptospermum juniperinum	100	2	Empodisma minus	80	1	Selaginella uliginosa	60	1
Melaleuca squarrosa	93	2	Gahnia radula	80	1	Bauera rubioides	53	1
Eucalyptus cephalocarpa	87	1	Eucalyptus radiata	73	1	Lindsaea linearis	53	1
Hakea nodosa	87	1	Gonocarpus tetragynus	73	1	Xanthosia dissecta	53	+
Stipa muelleri	87	2	Hakea teretifolia	60	1			

NO. OF SITES: 15 (1.5% of total)

DISTRIBUTION: Mostly restricted to the valleys associated with the northern highlands of the Study Area.

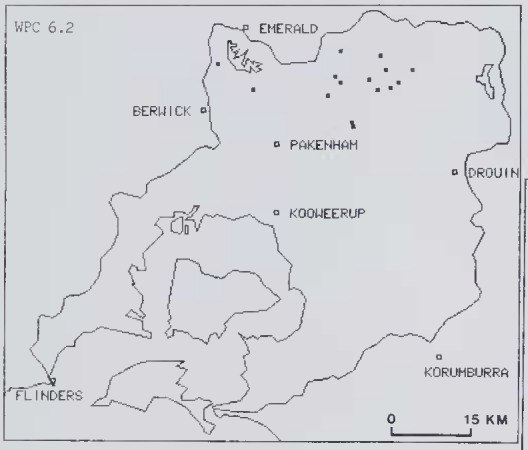
ENVIRONMENT: Clay soils which are often wet. Median annual rainfall is 1200-1300 mm.

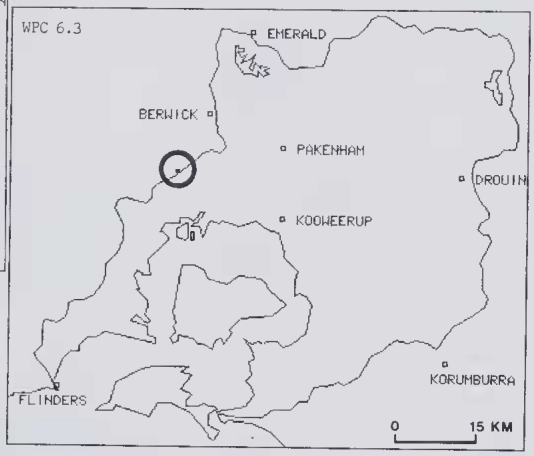
ALTITUDE: Mean = 118 m, Highest = 190 m, Lowest = 70m.

STRUCTURE: Open-forest to Woodland

MEAN FLORISTIC RICHNESS: 37 species per site. MEAN WEED COMPOSITION: 4% of species, 3% of cover.

NOTES: Intermediate in floristic composition between WPC 6.1 and WPC 7.2 and consequently supports species characteristic of both.





WET HEATHLAND : SUB-COMMUNITY WPC 6.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Empodisma minus	100	2	Gahnia sieberiana	100	1	Baumea tetragona	100	2
Cassytha glabella	100	+	Lepidosperma longitudinale	100	1	Melaleuca squarrosa	100	3
Eucalyptus cephalocarpa	100	2	Leptospermum juniperinum	100	2	Schoenus brevifolius	100	1

NO. OF SITES: 1 (0.1% of total)

DISTRIBUTION: Occurs at Cranbourne and surrounds.

ENVIRONMENT: Grows in wet depressions in low nutrient sandy soils in which the drainage is impeded by an underlying layer of clay or coffee rock. Median annual rainfall is approximately 800 mm.

ALTITUDE: All 70 m.

STRUCTURE: Open-scrub

MEAN FLORISTIC RICHNESS: 9 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: The tree layer of this sub-community is sparse. *Melaleuca squarrosa* and *Leptospermum juniperinum* dominate the shrub layer and form dense thickets up to 7 m high. This is in contrast to the form *Melaleuca squarrosa* on the higher nutrient soils of the ranges in the north of the Study Area. For example, in WPC 3.1 *M. squarrosa* may reach heights of 10 m and have a trunk diameter of 0.3 m at standard breast height.

The ground layer of WPC 6.3 is dominated by sedges

This sub-community corresponds to Group 6 Community 2 described by Gullan (1978).

WPC 6.3 also has affinities with the Coastal Heathland of WPC 15.4.

SCLEROPHYLL WOODLAND : SUB-COMMUNITY WPC 7.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Stipa muelleri	96	3	Banksia spinulosa	73	1	Lomandra longifolia	56	1
Tetrarrhena juncea	89	1	Amperea xiphoclada	71	1	Pultenaea gunnii	53	1
Pteridium esculentum	89	1	Acrotriche prostrata	69	1	Poa australis spp. agg.	49	1
Gahnia radula	87	1	Spyridium parvifolium	69	1	Acacia myrtifolia	49	1
Leptospermum juniperinum	80	1	Eucalyptus sieberi	67	1	Hakea ulicina	47	1
Lomandra filiformis	80	1	Lomatia ilicifolia	64	1	Banksia marginata	47	1
Goodenia lanata	78	1	Eucalyptus obliqua	64	2	Pultenaea scabra	44	1
Conocarpus tetragynus	78	1	Eucalyptus radiata	64	1	Dianella caerulea	42	+
Lepidosperma laterale	78	1	Billardiera scandens	64	+	Lindsaea linearis	40	1
Viola hederacea	76	1	Epacris impressa	64	1	Dampiera stricta	40	1
Hakea sericea	73	1	Eucalyptus baxteri	56	1	Xanthorrhoea minor	38	+

NO. OF SITES: 45 (4.4% of total)

DISTRIBUTION: Restricted to the lower slopes of highlands in the north of the Study Area.

ENVIRONMENT: Undulating country or loamy to sandy loam soils with good drainage. Often on southern or eastern aspects of the hills. Median annual rainfall is 1100-1300 mm.

ALTITUDE: Mean = 177 m, Highest = 350 m, Lowest = 80 m.

STRUCTURE: Open-forest

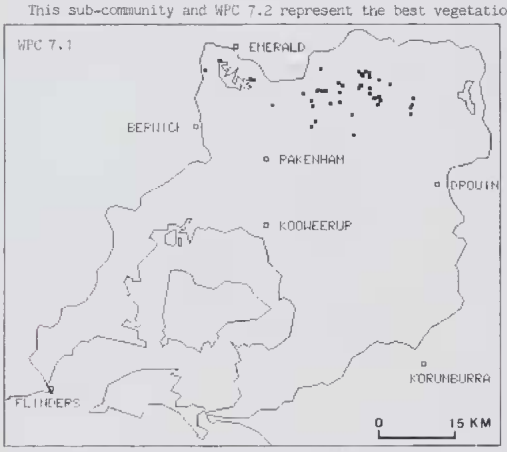
MEAN FLORISTIC RICHNESS: 34 species per site. MEAN WEED COMPOSITION: 1% of species, 1% of cover.

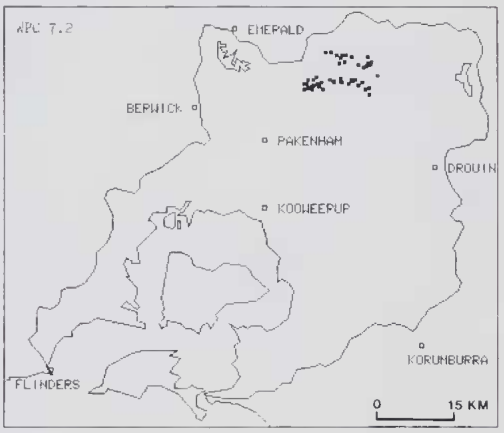
NOTES: The tallest vegetation of Community 7 and has accordingly been exploited for timber: *Eucalyptus obliqua*, *E. sieberi* and *E. baxteri* being the principal sawlog species.

The high *Stipa muelleri* values may be related to a high fire frequency as this species responds well to burning.

WPC 7.1 lacks many of the heathland species common in other Community 7 vegetation and instead supports some species which are characteristic of many Damp Sclerophyll Forests e.g. *Spyridium parvifolium*, *Viola hederacea* and *Billardiera scandens*.

This sub-community and WPC 7.2 represent the best vegetation in the State for *Banksia spinulosa*.





SCLEROPHYLL WOODLAND : SUB-COMMUNITY WPC 7.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Stipa muelleri	100	4	Eucalyptus cephalocarpa	80	1	Lomandra filiformis	61	1
Eucalyptus dives	96	2	Caustis pentandra	76	1	Amperea xiphoclada	59	1
Hakea sericea	96	2	Lepidosperma laterale	76	1	Goodenia lanata	59	+
Hovea heterophylla	89	1	Leptospermum juniperinum	76	1	Gompholobium huegelii	50	+
Dampiera stricta	87	1	Monotoca scoparia	74	1	Persoonia juniperina	46	+
Gahnia radula	87	1	Hakea ulicina	70	1	Tetrarrhena juncea	43	1
Epacris impressa	85	1	Pultenaea gunnii	70	1	Acrotriche prostrata	43	+
Banksia marginata	85	1	Leptospermum myrsinoides	70	1	Acrotriche serrulata	43	1
Conocarpus tetragynus	85	+	Lomatia ilicifolia	67	1	Burchardia umbellata	41	+
Xanthorrhoea minor	83	1	Cassytha glabella	63	+	Acacia oxycedrus	39	1
Banksia spinulosa	80	1						

NO. OF SITES: 46 (4.5% of total)

DISTRIBUTION: Restricted to the northern slopes of the Mt. Towt range and the Black Snake Range in the north of the Study Area.

ENVIRONMENT: Sandy-clay soils on undulating lowlands subject to north-westerly winds. Median annual rainfall is 1100-1300 mm.

ALTITUDE: Mean =151 m, Highest = 300 m, Lowest = 80 m.

STRUCTURE: Low open-forest to Woodland

MEAN FLORISTIC RICHNESS: 33 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: The high cover values of *Stipa muelleri* are probably a result of the frequent fires suffered by this sub-community.

WPC 7.2 and WPC 7.1 represent the best vegetation in the State for *Banksia spinulosa*.

The dominance of members of the Proteaceae, Gramineae and Cyperaceae make this vegetation particularly significant for granivorous and nectivorous animals (e.g. finches and honeyeaters).

SCLEROPHYLL WOODLAND : SUB-COMMUNITY WPC 7.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gonocarpus tetragynus	96	1	Cassinia aculeata	65	1	Hakea nodosa	45	1
Leptospermum juniperinum	96	1	Eucalyptus radiata	62	1	Lindsaea linearis	45	+
Gahnia radula	95	1	Acacia myrtifolia	60	1	Helichrysum scorpioides	45	+
Eucalyptus cephalocarpa	87	1	Amyema pendulum	58	1	Gompholobium huegelii	44	+
Epacris impressa	85	1	Themeda australis	56	1	Xanthorrhoea minor	42	+
Platylobium obtusangulum	84	1	Billardiera scandens	56	+	Anthoxanthum odoratum	40	1
Banksia marginata	78	1	Microlaena stipoides	56	+	Centaurium pulchellum	40	+
Stipa muelleri	78	3	Hypochoeris radicata	55	+	Burchardia umbellata	40	+
Acrotriche serrulata	76	1	Eucalyptus obliqua	53	1	Lomandra filiformis	40	+
Deyeuxia quadriseta	75	1	Leptospermum myrsinoides	53	1	Goodenia lanata	40	1
Acrotriche prostrata	73	1	Pultenaea gunnii	53	1	Drosera auriculata	38	+
Hakea ulicina	73	1	Lepidosperma laterale	53	1	Lomandra longifolia	38	+
Poa australis spp. agg.	67	1	Danthonia pallida	47	1	Danthonia pilosa	36	1
Hibbertia stricta	65	1	Casuarina paludosa	45	1	Hypericum gramineum	36	+

NO. OF SITES: 55 (5.4% of total)

DISTRIBUTION: Clustered in and around the catchment of the Cardinia Reservoir.

ENVIRONMENT: Clay-loam soils on undulating lowlands south of the Dandenong Ranges. Median annual rainfall is 1000-1100 mm.

ALTITUDE: Mean = 170 m, Highest = 250 m, Lowest = 70 m.

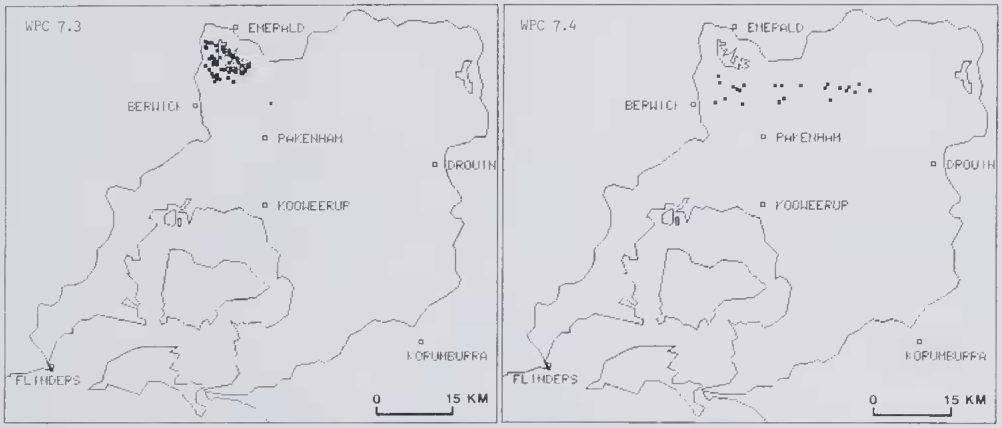
STRUCTURE: Low-woodland

MEAN FLORISTIC RICHNESS: 41 species per site. MEAN WEED COMPOSITION: 6% of species, 5% of cover.

NOTES: Much of the land associated with this vegetation is partially improved pasture with the consequence that introduced grasses and herbs are a common component of its flora.

The greater nutrient status of the soils of WPC 7.3, compared with WPC 7.2, has resulted in an abundance of grasses and herbs in the understorey of the former in place of the sclerophyllous species of the latter. Of particular significance is the abundance of *Themeda australis* (Kangaroo Grass) in areas not completely dominated by *Stipa muelleri*.

The high cover values of *Stipa muelleri* are probably a result of the frequent fires suffered by this sub-community.



SCLEROPHYLL WOODLAND : SUB-COMMUNITY WPC 7.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gahnia radula	92	1	Deyeuxia quadriseta	71	+	Lomandra filiformis	58	1
Gonocarpus tetragynus	92	1	Goodenia lanata	71	+	Billardiera scandens	58	+
Leptospermum juniperinum	92	1	Banksia marginata	67	1	Burchardia umbellata	58	+
Eucalyptus obliqua	83	2	Epacris impressa	67	1	Pultenaea gunnii	54	1
Acrotriche prostrata	83	1	Eucalyptus radiata	63	1	Helichrysum scorpioides	50	1
Poa australis spp. agg.	79	1	Acrotriche serrulata	63	+	Danthonia pallida	50	2
Stipa muelleri	79	3	Lepidosperma laterale	63	1	Dipodium punctatum	50	+
Pteridium esculentum	79	1	Xanthorrhoea minor	63	+	Hakea sericea	50	1
Hypochoeris radicata	71	+						

NO. OF SITES: 27 (2.7% of total.

DISTRIBUTION: Contained within a band which stretches east-west across the Study Area and is bounded by the Cardinia Reservoir in the north and the Princes Highway in the south.

ENVIRONMENT: Clay-loam soils on undulating country south of Central Highlands. Median annual rainfall is 1000-1200 mm.

ALTITUDE: Mean = [illegible] m, Highest = 410 m, Lowest = 40 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 39 species per site. MEAN WEED COMPOSITION: 6% of species, 4% of cover.

NOTES: This sub-community is floristically very similar to WPC 7.3 and the differences between them may be related to their histories rather than environmental features. For example, in WPC 7.4 *Stipa muelleri* dominates the understorey at the expense of *Themeda australis*, probably as a result of frequent fires. In contrast, the introduced grasses and herbs, common in WPC 7.3, are absent from WPC 7.4 because of the neglible pasture improvement associated with the latter.

SCLEROPHYLL WOODLAND : SUB-COMMUNITY WPC 7.5

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	100	1	Billardiera scandens	80	+	Eucalyptus dives	70	1
Eucalyptus goniocalyx	100	1	Danthonia pallida	80	2	Lomandra filiformis	70	1
Hypericum gramineum	100	+	Viola hederacea	80	1	Microlaena stipoides	70	+
Poa australis spp. agg.	90	2	Gonocarpus tetragynus	70	1	Burchardia umbellata	60	+
Acrotriche prostrata	90	1	Helichrysum scorpioides	70	1	Acacia stricta	60	1
Deyeuxia quadriseta	90	1	Leptospermum juniperinum	70	1	Eucalyptus obliqua	60	1
Dichelachne micrantha	90	+	Stipa nervosa	70	1	Lepidosperma laterale	60	1
Gahnia radula	90	1	Acrotriche serrulata	70	+	Pteridium esculentum	60	1
Themeda australis	90	2	Cassinia aculeata	70	+	Xanthorrhoea minor	60	1

NO. OF SITES: 10 (1.0% of total)

DISTRIBUTION: Restricted to the hills in and around the catchment of Beaconsfield Reservoir.

ENVIRONMENT: Clay soils of exposed, undulating low lands south of the Dandenong Ranges. Median annual rainfall is 1000-1300 mm.

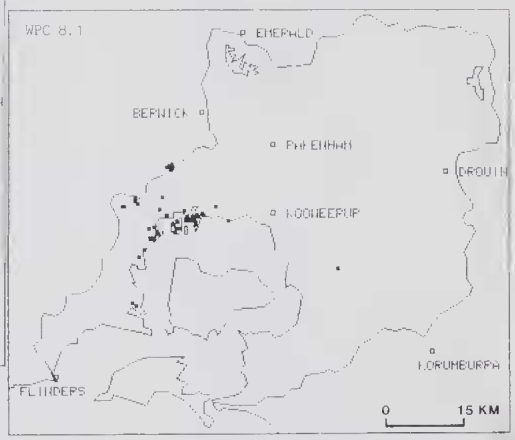
ALTITUDE: Mean = 138 m, Highest = 200 m, Lowest = 80 m.

STRUCTURE: Low open-forest

MEAN FLORISTIC RICHNESS: 44 species per site. MEAN WEED COMPOSITION: 7% of species, 5% of cover.

NOTES: This is the only sub-community of Community 7 which does not have an understorey dominated by *Stipa muelleri* and the only vegetation in the Study Area with *E. goniocalyx* as a character species. Most of the sites supporting this vegetation have been grazed and introduced species are often common. However, deliberate pasture improvement has not usually been effected and the native grasses *Poa australis, Themeda australis* and *Danthonia pallida* always dominate the understorey.

In many places the *E. goniocalyx* appear to be 100 years old or more.



Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	93	1	Dillwynia glaberrima	65	1	Drosera whittakeri	46	1
Monotoca scoparia	89	1	Banksia marginata	60	1	Cassytha glabella	40	1
Leptospermum myrsinoides	85	3	Leucopogon virgatus	58	1	Bryum billardieri	39	1
Actus ericoides	79	1	Cladonia spp.	57	1	Orchidaceae spp.	38	+
Leptospermum juniperinum	78	2	Campylopus spp.	51	1	Gonocarpus tetragynus	38	1
Eucalyptus viminalis	75	2	Cladia aggregata	47	1			
Amperea xiphoclada	74	1	Hibbertia acicularis	47	1			

NO. OF SITES: 72 (7.1% of total)

DISTRIBUTION: Concentrated on the north-western periphery of the bay with a few scattered occurrences near Crib Point to the south and Lang Lang to the east.

ENVIRONMENT: Flat or undulating near-coastal areas on deep siliceous sands. Median annual rainfall is between 700 and 800 mm.

ALTITUDE: Mean = 17 m, Highest = 100 m, Lowest = sea level.

STRUCTURE: Closed-heath to Open-woodland

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: 1% of species (negligible cover).

NOTES: The principle difference between WPC 8.1 and WPC 8.2 is the dominance of *Eucalyptus viminalis* in the former and *E. radiata* in the latter. Other floristic differences are evident, but the change in tree species is the most evident. This variation is probably accounted for by the higher rainfall and cooler temperatures of sites supporting WPC 8.2.

Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	100	1	Xanthorrhoea minor	59	1	Cladia aggregata	52	1
Leptospermum juniperinum	96	1	Amperea xiphoclada	59	+	Aotus ericoides	52	+
Leptospermum myrsinoides	96	3	Hibbertia acicularis	56	1	Banksia marginata	52	1
Dillwynia glaberrima	78	1	Cahnia radula	56	2	Drosera auriculata	48	+
Monotoca scoparia	70	1	Cassytha glabella	56	+			
Eucalyptus radiata	67	2	Campylopus spp.	56	1			

NO. OF SITES: 28 (2.8% of total)

DISTRIBUTION: Restricted to the western periphery of the bay between Lang Lang and Glen Forbes.

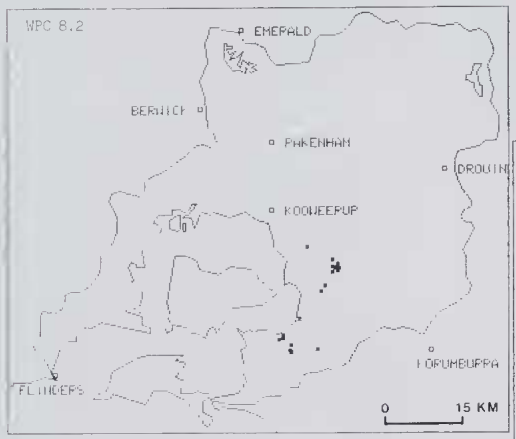
ENVIRONMENT: Flat or undulating near-coastal areas on deep siliceous sands. Median annual rainfall is approximately 900 mm.

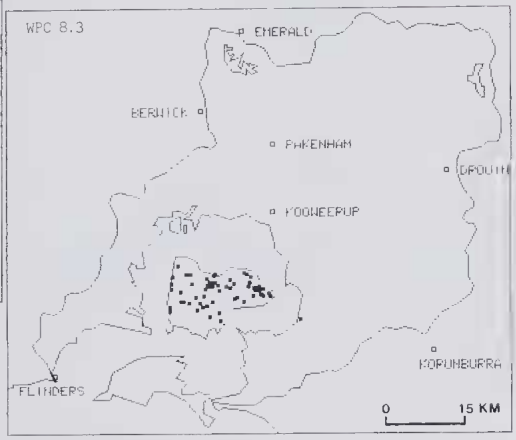
ALTITUDE: Mean = 53 m, Highest = 90 m, Lowest = 20 m.

STRUCTURE: Low woodland

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: Negligible

NOTES: WPC 8.2 and WPC 8.1 constitute the eastern and western variants of the same vegetation: the subtle floristic difference between these sub-communities is probably accounted for by the higher rainfall and cooler temperatures of sites supporting WPC 8.2.





Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	97	1	Acacia suaveolens	66	1	Cahnia radula	55	1
Dillwynia glaberrima	95	1	Gonocarpus teucrioides	64	1	Hypolaena fastigiata	47	2
Leptospermum juniperinum	92	2	Pteridium esculentum	63	1	Drosera auriculata	45	+
Banksia marginata	88	1	Hibbertia acicularis	63	1	Platylobium obtusangulum	42	1
Leptospermum myrsinoides	88	2	Amperea xiphoclada	61	1	Eucalyptus obliqua	41	1
Aotus ericoides	86	1	Cassytha glabella	61	1	Campylopus spp.	39	1
Monotoca scoparia	78	1	Leucopogon virgatus	59	1	Cladia aggregata	36	1
Lepidosperma concavum	75	1	Hibbertia fasciculata	56	1			

NO. OF SITES: 64 (6.2% of total)

DISTRIBUTION: Common on French Is. north of Tankerton and Salt Mine Point roads. One isolated occurrence north-east of Grantville on the mainland.

ENVIRONMENT: Flat or undulating near-coastal areas on sand deeper than that supporting Community 15 and shallower than that supporting WPC 8.1 and WPC 8.2. Median annual rainfall between 700 and 900 mm.

ALTITUDE: Mean = 38 m, Highest = 90 m, Lowest = 5 m.

STRUCTURE: Low open-shrubland

MEAN FLORISTIC RICHNESS: 24 species per site. MEAN WEED COMPOSITION: Negligible

NOTES: This is the commonest vegetation type on French Island. It is consistently floristically richer than WPC 8.1 and WPC 8.2 yet contains appreciable amounts of *Platylobium obtusangulum* and *Pteridium esculentum*, both species indicative of fire disturbance. The canopy layer, generally sparser and lower than either WPC 8.1 and WPC 8.2, usually consists of *Eucalyptus obliqua* or *E. radiata*. Sites which are periodically waterlogged contain wetland species such as *Melaleuca squarrosa* and *Schoenus tenuissimus*.

Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Epacris impressa	100	1	Gahnia radula	80	3	Conocarpus tetragynus	80	1
Eucalyptus obliqua	100	2	Cladia aggregata	80	1	Drosera auriculata	60	1
Leptospermum juniperinum	100	2	Cladonia spp.	80	1	Campylopus spp.	60	1
Leptospermum myrsinoides	100	3	Dillwynia glaberrima	80	1			

NO. OF SITES: 5 (0.5% of total)

DISTRIBUTION: Restricted to the area between Queensferry and Corinella on the south-east periphery of the bay.

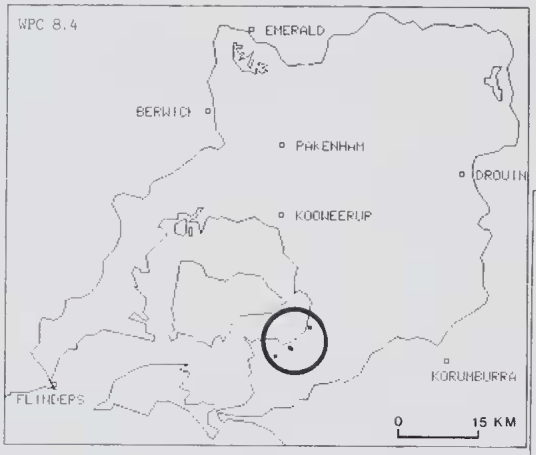
ENVIRONMENT: Flat or undulating near-coastal areas on deep siliceous sands. Median annual rainfall is between 800 and 900 mm.

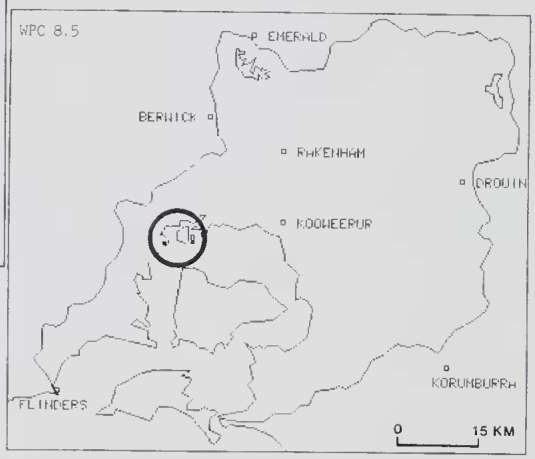
ALTITUDE: Mean = 37 m, Highest = 50 m, Lowest = 5 m.

STRUCTURE: Low woodland

MEAN FLORISTIC RICHNESS: 18 species per site. MEAN WEED COMPOSITION: No weeds

NOTES: A floristically depauperate vegetation with affinities for *Leptospermum myrsinoides* Heathland and Damp Sclerophyll Forest. The low species number and abundance of *Gahnia radula* in the understorey suggest a history of fire disturbance. Most sites showed signs of recent fire.





Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.5

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gahnia radula	100	3	Epacris impressa	80	+	Xanthorrhoea minor	60	1
Leptospermum juniperinum	100	2	Eucalyptus viminalis	80	3			

NO. OF SITES: 5 (0.49% of total)

DISTRIBUTION: Restricted to Yaringa and Chinaman Island.

ENVIRONMENT: Flat or undulating areas on deep siliceous sands. Median annual rainfall is 700-800 mm.

ALTITUDE: Mean = 8 m, Highest = 10 m, Lowest = 2 m.

STRUCTURE: Low woodland

MEAN FLORISTIC RICHNESS: 18 species per site. MEAN WEED COMPOSITION: 1% of species, cover is negligible.

NOTES: WPC 8.5 represents a disturbed form of WPC 8.1 most probably in reaction to regular burning and/or grazing. In this case the heath understorey has been replaced by a dense cover of the coarse sedge *Gahnia radula*.

Leptospermum myrsinoides HEATHLAND : SUB-COMMUNITY WPC 8.6

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Pteridium esculentum	93	3	Eucalyptus viminalis	68	2	Epacris impressa	67	+
Leptospermum juniperinum	89	2						

NO. OF SITES: 28 (2.75% of total)

DISTRIBUTION: Dispersed throughout the periphery of the bay and its islands, excluding French Island.

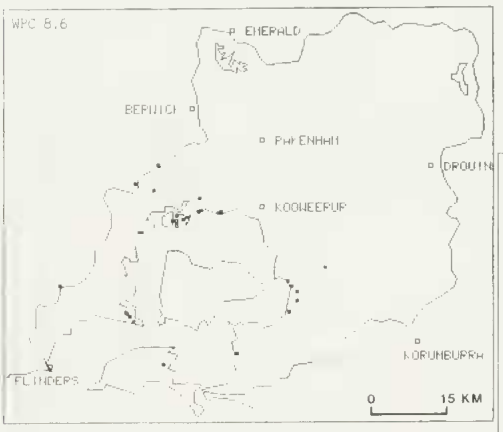
ENVIRONMENT: Flat or undulating areas on deep siliceous sands. Median annual rainfall is between 700 and 800 mm.

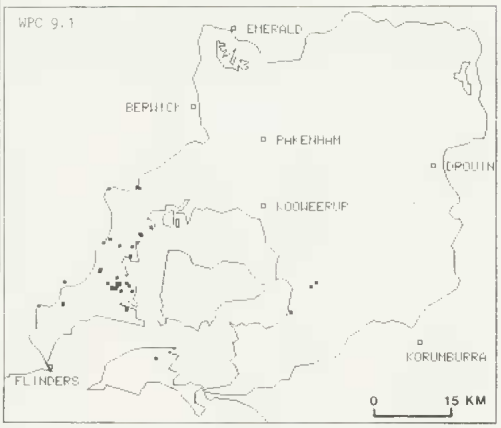
ALTITUDE: Mean = 23 m, Highest = 90 m, Lowest = 2 m.

STRUCTURE: Low woodland to open-forest

MEAN FLORISTIC RICHNESS: 17 species per site. MEAN WEED COMPOSITION: 6% of species, 3% of cover.

NOTES: This large sub-community represents a highly disturbed form of WPC 8.1 and WPC 8.2. Its very low floristic richness and the abundance of bracken (*Pteridium esculentum*) in the understorey is undoubtedly a result of a high fire frequency. Many sites within the catchment belonging to this sub-community were not sampled.





GRASSY WOODLAND : SUB COMMUNITY WPC 9.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leptospermum juniperinum	86	2	Epacris impressa	55	1	Poa australis spp. agg.	45	1
Acrotriche serrulata	71	1	Hibbertia stricta	53	1	Eucalyptus obliqua	43	2
Themeda australis	69	2	Lomandra filiformis	51	+	Burchardia umbellata	39	+
Hypericum gramineum	67	1	Xanthorrhoea minor	49	1	Lomandra longifolia	39	1
*Hypochoeris radicata	61	+	Drosera auriculata	47	+	Banksia marginata	39	1
Gahnia radula	59	1	Pteridium esculentum	47	1	Lepidosperma laterale	37	1
Gonocarpus tetragynus	59	1	Eucalyptus radiata	45	2	Viola hederacea	37	1

NO. OF SITES: 49 (4.8% of total)

DISTRIBUTION: Mostly coastal and near-coastal areas to the west of Western Port.

ENVIRONMENT: Flat or undulating inland areas on soils mainly composed of ferruginous sands and sandy clays. Median annual rainfall is 800-900 mm.

ALTITUDE: Mean = 39 m, Highest = 170 m, Lowest = 5 m.

STRUCTURE: Woodland

MEAN FLORISTIC COMPOSITION: 28 species per site. MEAN WEED COMPOSITION: 6% of species, 5% of cover.

NOTES: This sub-community is probably a more disturbed and species-poor version of WPC 9.2 and several of the most abundant species here are indicative of severe disturbance, (e.g. *Pteridium esculentum, Leptospermum juniperinum, Gahnia radula*), particularly from fire and grazing. However, the disturbance may not be as great as is indicated by the floristics. For example, the native grass *Themeda australis* is more abundant in WPC 9.1 than in WPC 9.2. Also the low apparent species richness may be due to the inability of field recorders (e.g. Calder (1974) and Grant (1974)) to identify many grasses, composites and annuals from vegetative parts.

GRASSY WOODLAND : SUB-COMMUNITY WPC 9.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Acrotriche serrulata	100	+	Dichopogon strictus	82	+	Casuarina littoralis	64	1
Drosera auriculata	100	1	Stipa pubescens	82	1	Lomandra longifolia	64	1
Gonocarpus tetragynus	100	1	Tricoryne elatior	82	1	Acacia mearnsii	64	1
*Hypochoeris radicata	100	1	Pteridium esculentum	82	1	*Aira caryophyllea	64	1
Lomandra filiformis	100	1	Poa australis spp. agg.	73	1	Oxalis corniculata	64	+
Themeda australis	100	1	*Anthoxanthum odoratum	73	1	Pimelea humilis	64	+
Leptospermum juniperinum	91	1	Schoenus apogon	73	1	*Holcus lanatus	55	+
Microlaena stipoides	91	1	Viola hederacea	73	+	*Rubus fruticosus spp. agg.	55	1
Poranthera microphylla	91	1	Exocarpos cupressiformis	64	+	Acacia verticillata	55	1
Acacia paradoxa	91	1	*Briza minor	64	+	Billardiera scandens	55	+
Hypericum gramineum	91	1	Acacia melanoxylon	64	1	Epacris impressa	55	1
Hibbertia stricta	82	1	Bossiaea prostrata	64	1	Eucalyptus radiata	55	1
Lepidosperma laterale	82	1	*Briza maxima	64	+	Lagenifera stipitata	55	+
Deyeuxia quadriseta	82	1	Burchardia umbellata	64	1	Pentapogon quadrifidus	55	+

NO. OF SITES: 11 (1.1% of total)

DISTRIBUTION: Mostly coastal and near-coastal areas to the west of Western Port.

ENVIRONMENT: Flat or undulating inland areas on soils mainly composed of ferruginous sands and sandy clays. Median annual rainfall is 800-900 mm.

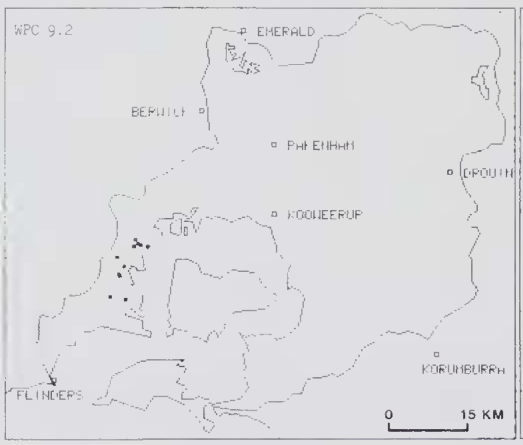
ALTITUDE: Mean = 21 m, Highest = 35 m, Lowest = 5 m.

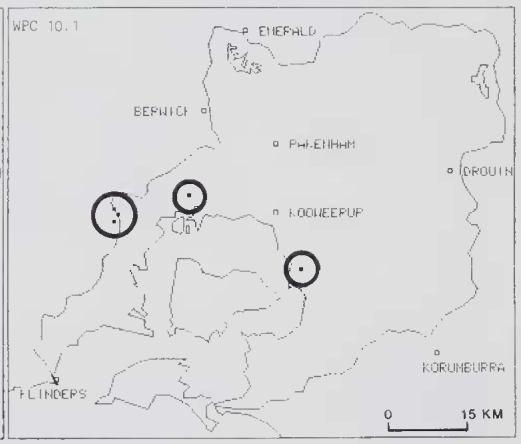
STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 51 species per site. MEAN WEED COMPOSITION: 16% of species, 15% of cover.

NOTES: The sparse canopy is usually made up of one or two of a range of eucalypts with *E. radiata* being the most common. The understorey is dominated by six species of native grass. Five species of introduced grass are also present but, apart from *Anthoxanthum odoratum*, do not displace the native species.

Grazing by domestic stock in many sites has caused a deterioration in the quality and abundance of most shrub layer species. However, stock tend to avoid the spiny shrub, *Acacia paradoxa*, large specimens of which are common throughout the sub-community.





SUB COMMUNITY WPC 10.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Eucalyptus pauciflora	100	1	Themeda australis	83	2	Lepidosperma laterale	67	2
Gahnia radula	100	1	Casuarina littoralis	83	2	Leptospermum juniperinum	67	1
Gonocarpus tetragynus	100	+	Acacia paradoxa	67	1			

NO. OF SITES: 6 (0.59% of total)

DISTRIBUTION: Restricted to the lowland plains in the south of the Study Area around Western Port.

ENVIRONMENT: Lowland plains. Median annual rainfall is 800 mm or less.

ALTITUDE: Mean = 51 m, Highest = 70 m, Lowest = 15 m.

STRUCTURE: Open-forest

MEAN FLORISTIC RICHNESS: 22 species per site. MEAN WEED COMPOSITION: 5% of species, 2% of cover.

NOTES: The sites in this sub-community are very disturbed remnants of a sub-community that was probably more widespread prior to European settlement. The abundance of *Themeda australis* suggests it was once a woodland with grassy understorey. The major disturbance to this sub-community would have resulted from selective grazing by cattle producing a reduction in the abundance of native grasses and an increased abundance of non-preferred species such as *Acacia paradoxa, Gahnia radula, Lepidosperma laterale* and *Leptospermum juniperinum*.

WPC 10.1 is part of a major disjunction in the distribution of *Eucalyptus pauciflora*. This species most commonly occurs in the alpine or sub-alpine regions of Victoria but also has a number of very isolated lowland occurrences. This sub-community represents the most south-easterly occurrence of the lowland populations in Victoria.

SUB-COMMUNITY WPC 12.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Comesperma volubile	100	1	Eucalyptus viminalis	100	3	Senecio spp.	75	+
Dianella revoluta	100	2	Lomandra longifolia	100	4			

NO. OF SITES: 4 (0.4% of total)

DISTRIBUTION: Restricted to Quail Island and Warneet.

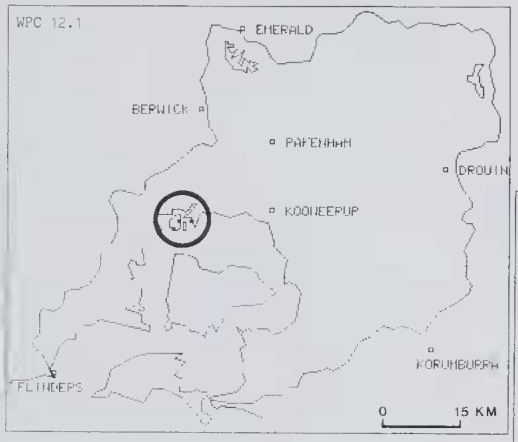
ENVIRONMENT: Flat or undulating areas on deep siliceous sands. Median annual rainfall is between 700 and 800 mm.

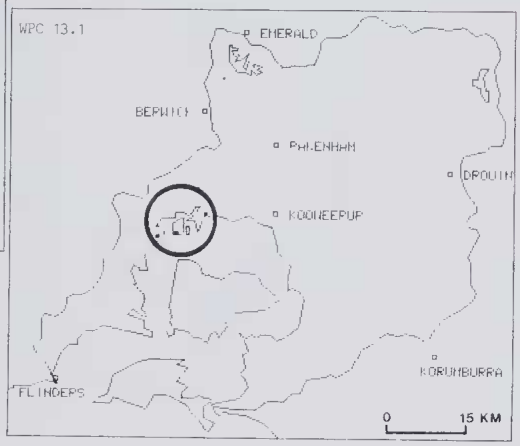
ALTITUDE: All 5 m.

STRUCTURE: Low woodland

MEAN FLORISTIC RICHNESS: 20 species per site. MEAN WEED COMPOSITION: 9% of species, 7% of cover.

NOTES: This low woodland community lacks a shrub layer. The dominance of the ground layer species, *Lomandra longifolia* and *Dianella revoluta*, may be the result of grazing.





Melaleuca ericifolia SCRUB : SUB-COMMUNITY WPC 13.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Cassytha pubescens	100	1	Lepyrodia muelleri	100	1	Epacris impressa	75	+
Gonocarpus tetragynus	100	+	Melaleuca ericifolia	100	4	Eucalyptus viminalis	75	1
*Hypochoeris radicata	100	+	Comesperma volubile	75	+	Gramineae spp.	75	+
Leptospermum juniperinum	100	1	Dichondra repens	75	1			

NO. OF SITES: 4 (0.4% of total)

DISTRIBUTION: Scattered throughout the Study Area.

ENVIRONMENT: Poorly drained fresh water swamps on sandy clays. Median annual rainfall is between 700 and 800 mm.

ALTITUDE: Mean = 4 m, Highest = 5 m, Lowest = 2 m.

STRUCTURE: Closed-scrub

MEAN FLORISTIC RICHNESS: 24 species per site. MEAN WEED COMPOSITION: 8% of species, 5% of cover.

NOTES: Dense thickets of *Melaleuca ericifolia*. The understorey of wet heath species has affinities with WPC 15.6 - the Coastal Heathland.

Melaleuca ericifolia SCRUB : SUB-COMMUNITY WPC 13.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Melaleuca ericifolia	100	3	*Hypochoeris radicata	50	1	Acacia verticillata	47	1

NO. OF SITES: 34 (3.3% of total)

DISTRIBUTION: Occurring on the lowlands around Western Port and on French Island.

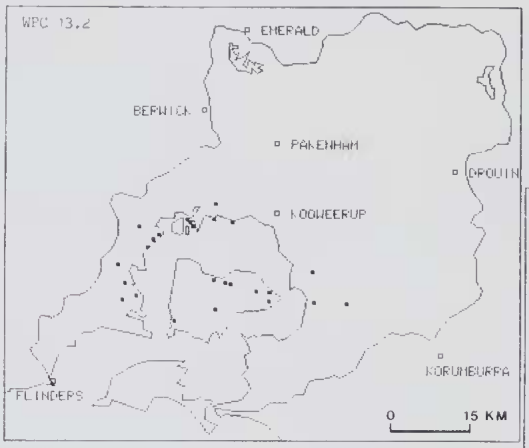
ENVIRONMENT: Freshwater swamps on clayey and peaty deposits. Median annual rainfall is less than 900 mm.

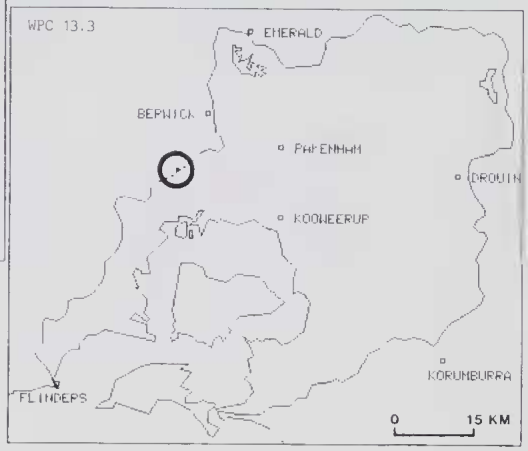
ALTITUDE: Mean = 18 m, Highest = 100 m, Lowest = 1 m.

STRUCTURE: Low woodland to closed-scrub

MEAN FLORISTIC RICHNESS: 20 species per site. MEAN WEED COMPOSITION: 9% of species, 7% of cover.

NOTES: This sub-community represents a disturbed remnant of a previously widespread vegetation type. The dense thickets of *Melaleuca ericifolia* have a variety of understoreys ranging from floristically depauperate sites, in which the ground layer consists only of mosses, to floristically richer sites in which many of the understorey species are shared with the abutting vegetation type.





Melaleuca ericifolia SCRUB : SUB-COMMUNITY WPC 13.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Eucalyptus cephalocarpa	100	1	Lepyrodia muelleri	100	2	Schoenus brevifolius	100	2
Lepidosperma longitudinale	100	2	Melaleuca ericifolia	100	3			
Leptospermum juniperinum	100	1	Poa australis spp. agg.	100	1			

NO. OF SITES: 1 (0.1% of total)

DISTRIBUTION: Occurs at Cranbourne and surrounds.

ENVIRONMENT: Poorly drained clay soils. Median annual rainfall is approximately 800 mm.

ALTITUDE: All 60 m.

STRUCTURE: Open-scrub

MEAN FLORISTIC RICHNESS: 7 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: This vegetation is physiognomically very similar to WPC 6.3 where, due to change from a clay to a sandy soil type, *Melaleuca ericifolia* is replaced by *M. squarrosa* and *Lepyrodia muelleri* is replaced by *Empodisma minus*. The ground layer of WPC 13.3, as for WPC 6.3, is a dense sward of sedges and rushes.

This sub-community corresponds to Group 8 described by Cullan (1978).

Melaleuca ericifolia SCRUB : SUB-COMMUNITY WPC 13.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Melaleuca ericifolia	100	3	Samolus repens	55	2	Disphyma clavellatum	50	2
Selliera radicans	59	1						

NO. OF SITES: 22 (5.3% of total)

DISTRIBUTION: Common along the eastern and western shoreline of Western Port.

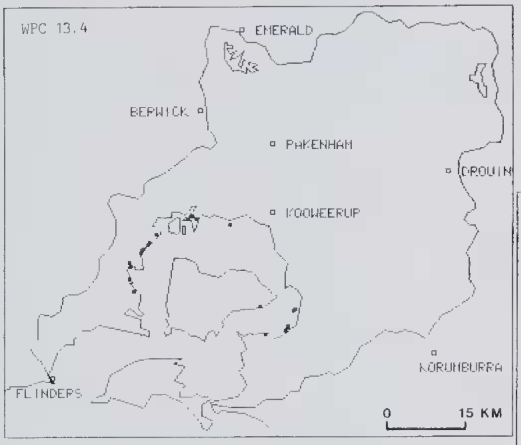
ENVIRONMENT: Areas bordering on salt marsh, beyond the influence of tides except extreme high tides.

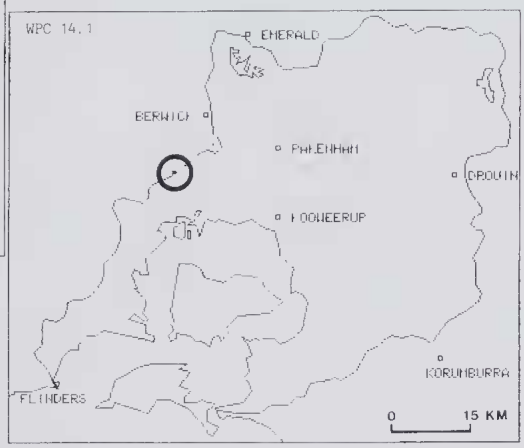
ALTITUDE: Sea level

STRUCTURE: Closed-scrub

MEAN FLORISTIC RICHNESS: 7 species per site. MEAN WEED COMPOSITION: 8% of species, 7% of cover.

NOTES: This sub-community forms a boundary or ecotone between the salt marsh and heathland/woodland communities. Sites are dominated by *Melaleuca ericifolia* with a variety of salt marsh species in the understorey.





SEDGE SWAMPLAND : SUB-COMMUNITY WPC 14.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Eucalyptus cephalocarpa	100	2	Lepidosperma longitudinale	100	1	Schoenus brevifolius	100	5
Eucalyptus viminalis	100	1	Leptospermum juniperinum	100	2			
Hakea ulicina	100	2	Lepyrodia muelleri	100	2			

NO. OF SITES: 1 (0.1% of total)

DISTRIBUTION: Occurs at Cranbourne and surrounds.

ENVIRONMENT: Water-logged sandy soils usually with 10 to 30 cm of standing water throughout the year. Median annual rainfall is approximately 800 mm.

ALTITUDE: All 60 m.

STRUCTURE: Closed-sedgeland

MEAN FLORISTIC RICHNESS: 7 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: The dense, but species-poor, sward of sedges characterising this sub-community is dominated by *Schoenus brevifolius*.

WPC 14.1 corresponds to Group 7 described by Gullan (1978).

SEDGE SWAMPLAND : SUB-COMMUNITY WPC 14.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gonocarpus micranthus	100	+	Patersonia fragilis	100	2	Cassytha glabella	67	1
Lepidosperma longitudinale	100	1	Schoenus brevifolius	100	2	Patersonia occidentalis	67	1
Leptospermum juniperinum	100	1	Selaginella uliginosa	100	1			

NO. OF SITES: 3 (0.3% of total)

DISTRIBUTION: Scattered in the north-west of French Island.

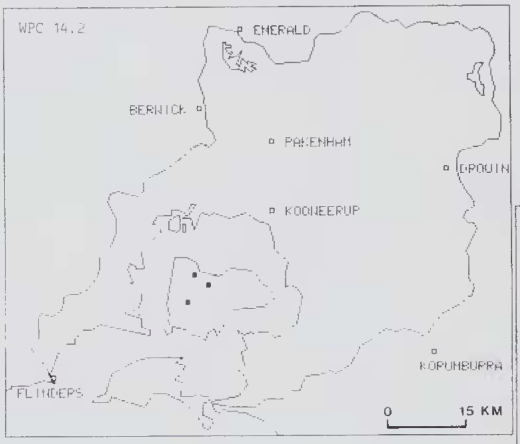
ENVIRONMENT: Near coastal heaths on wet sandy soils. Median annual rainfall is between 700 and 800 mm.

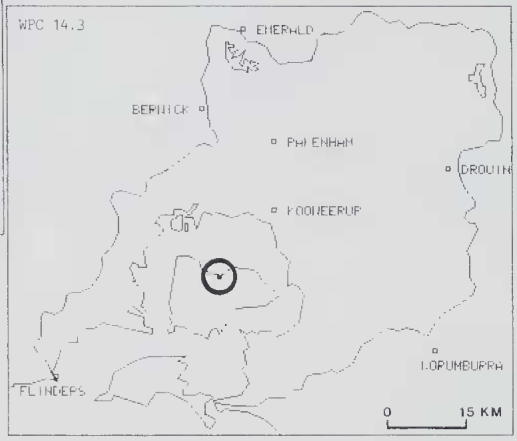
ALTITUDE: Mean = 26 m, Highest = 45 m, Lowest = 10 m.

STRUCTURE: Closed-sedgeland

MEAN FLORISTIC RICHNESS: 14 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: A floristically-richer variant of WPC 14.3. Open-swamp dominated by monocotyledons.





SEDGE SWAMPLAND : SUB-COMMUNITY WPC 14.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Lepidosperma longitudinale	100	3	Sphagnum subsecundum	100	3			

NO. OF SITES: 2 (0.2% of total)

DISTRIBUTION: Two sites, less than 200 m apart, on the north-central coast of French Island.

ENVIRONMENT: Poorly drained fresh water swamp on clayey and sandy deposits. Median annual rainfall is between 700 and 800 mm.

ALTITUDE: All 10 m.

STRUCTURE: Sedgeland

MEAN FLORISTIC RICHNESS: 3 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: A floristically-poor sub-community characterised by species which are able to tolerate water-logged soil conditions.

COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Boronia parviflora	100	1	Baumea juncea	100	2	*Cicendia filiformis	67	1
Casuarina pusilla	100	1	Mitrasacme paradoxa	100	+	Gahnia trifida	67	1
Centrolepis aristata	100	+	Caesia parviflora	67	+	Hakea nodosa	67	1
Danthonia setacea	100	1	Lepidosperma longitudinale	67	1	*Leontodon taraxacoides	67	+
Deyeuxia quadriseta	100	1	Schoenus brevifolius	67	2	Olearia ramulosa	67	1
Drosera pygmaea	100	1	Schoenus latelaminatus	67	+	Schoenus apogon	67	1
Entolasia marginata	100	1	Thysanotus tuberosus	67	1	Selliera radicans	67	1
Goodenia humilis	100	1	Aphelia gracilis	67	+	Stylidium beaugleholei	67	+
Leptospermum juniperinum	100	1	Casuarina paludosa	67	1	Stylidium despectum	67	1

NO. OF SITES: 3 (0.3% of total)

DISTRIBUTION: Three isolated occurrences in the western part of French Island.

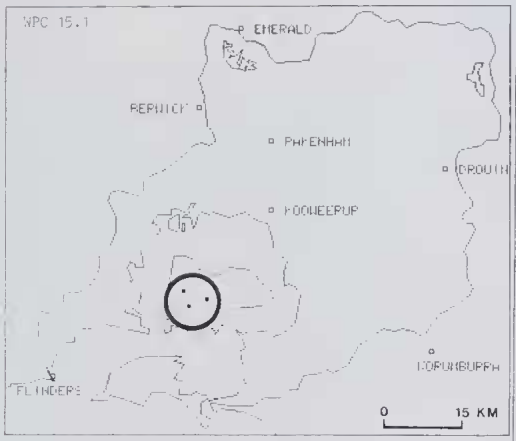
ENVIRONMENT: Ground subject to standing water most of the year but dries out in summer. Median annual rainfall is between 700 and 800 mm.

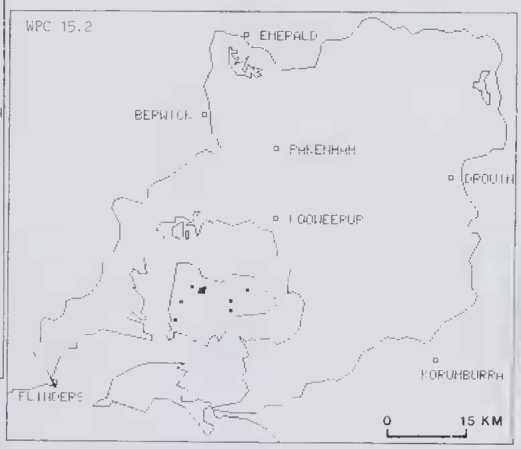
ALTITUDE: Mean = 33 m, Highest = 50 m, Lowest = 15 m.

STRUCTURE: Low shrubland

MEAN FLORISTIC RICHNESS: 39 species per site. MEAN WEED COMPOSITION: 6% of species, 5% of cover.

NOTES: Ground bare between the shrubs and monocotyledinous tussocks, except during summer when it is sparsely covered with large numbers of a range of very small (ca. 3 cm) annuals. Five species of these annuals possess adaptations specific to small insects and form an interesting and important component of this sub-community. They are *Drosera pygmaea* and *Polypompholyx tenella*, which are insectivorous, and *Stylidium beaugleholei*, *S. despectum* and *S. perpusillum* which are trigger plants.





COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Casuarina pusilla	100	1	Hibbertia stricta	90	1	Stipa hemipogon	70	1
Gahnia radula	100	2	Platylobium obtusangulum	90	1	Thysanotus tuberosus	70	1
Lepidosperma neesii	100	2	Stypandra caespitosa	90	1	Opercularia varia	60	+
Leptospermum juniperinum	100	2	Viola sieberiana	80	1	Drosera auriculata	60	+
Schoenus brevifolius	100	2	Lindsaea linearis	80	1	Epacris impressa	60	1
Xanthosia pusilla	100	1	Schoenus apogon	70	1	Microlaena stipoides	60	1
Drosera pygmaea	90	1	Caesia parviflora	70	+	Xanthorrhoea minor	60	1
Casuarina paludosa	90	1	Chamaescilla corymbosa	70	1			
Entolasia marginata	90	2	Gonocarpus teucrioides	70	1			

NO. OF SITES: 10 (1.0% of total)

DISTRIBUTION: Scattered throughout French Island with a small concentration in the north-west.

ENVIRONMENT: Shallow siliceous sands or ferruginous sands and clays often waterlogged. Median annual rainfall is between 700 and 900 mm.

ALTITUDE: Mean = 27 m, Highest = 80 m, Lowest = 10 m.

STRUCTURE: Low shrubland to sedgeland

MEAN FLORISTIC RICHNESS: 36 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: An unusually high proportion of monocotyledons are represented in this sub-community. Two of these, *Lepidosperma neesii* and *Entolasia marginata*, uncommon elsewhere in the Western Port Catchment, indicate the strong affinities this sub-community has for East Gippsland coastal heaths. WPC 15.2 is floristically very similar to EG Community 17. sub-community 1 (Forbes *et al.* 1982).

The vegetation of most of these sites is approximately five years old and has recently been subjected to fire and/or grazing.

COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.3

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Casuarina pusilla	100	1	Schoenus brevifolius	80	2	Orosera pygmaea	60	1
Drosera auriculata	100	1	Stypandra caespitosa	80	1	Gahnia radula	60	2
Leptospermum juniperinum	100	2	Caesia parviflora	80	+	Gonocarpus micranthus	60	1
Schoenus tenuissimus	90	1	Platylobium obtusangulum	70	1	Gonocarpus teucrioides	60	1
Dillwynia glaberrima	90	1	Banksia marginata	70	+	Microlaena stipoides	60	1
Opercularia varia	90	+	Empodisma minus	70	1	Selaginella uliginosa	60	1
Casuarina paludosa	80	1	Patersonia fragilis	70	2	Xanthosia dissecta	60	+
Epacris impressa	80	1	Xanthosia pusilla	70	+			

NO. OF SITES: 10 (1.0% of total)

DISTRIBUTION: Scattered throughout French Island.

ENVIRONMENT: Shallow ferruginous, sands overlying ferruginous clays or shallow sands: wetter than WPC 7.2. Median annual rainfall is between 700 and 900 mm.

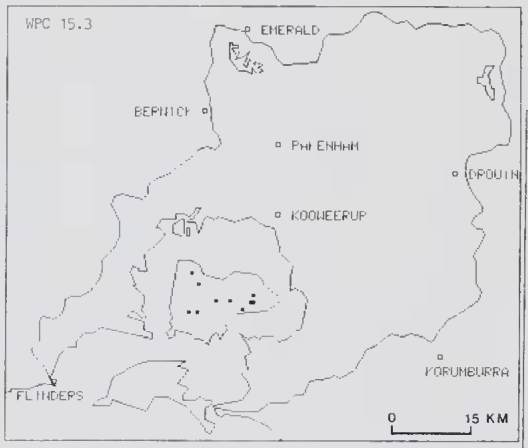
ALTITUDE: Mean = 40 m, Highest = 70 m, Lowest = 10 m.

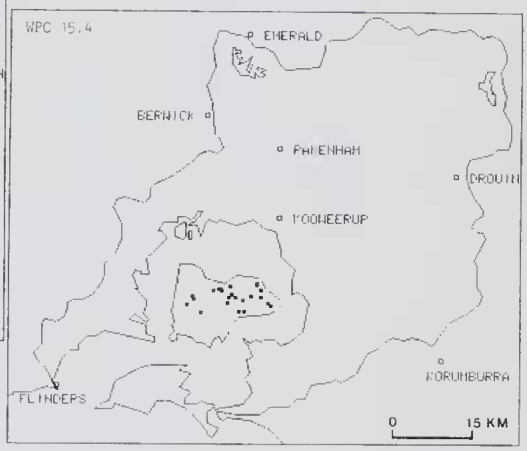
STRUCTURE: Open-heath to sedgeland

MEAN FLORISTIC RICHNESS: 35 species per site. MEAN WEED COMPOSITION: 3% of species, 2% of cover.

NOTES: In this sub-community a group of species restricted to WPC 15.2 is replaced by a group of species adapted to tolerate standing water for long periods. WPC 15.3 represents a transition from the drier WPC 15.2 to the wetter WPC 15.4.

The vegetation of most sites is approximately five to ten years old and is regenerating after being subjected to a variety of disturbances e.g. fire, clearing or grazing.





COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.4

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leptospermum juniperinum	100	2	Cassytha glabella	79	1	Banksia marginata	54	+
Melaleuca squarrosa	88	2	Gahnia radula	67	2	Bauera rubioides	50	1
Empodisma minus	83	2	Gonocarpus teucrioides	67	1	Orosera auriculata	50	1
Selaginella uliginosa	83	1	Schoenus brevifolius	54	2	Schoenus tenuissimus	50	2
Epacris obtusifolia	79	1	Sprengelia incarnata	54	2			

NO. OF SITES: 24 (2.4% of total)

DISTRIBUTION: Widespread throughout the north of French Island but with the majority of sites located in the north-east.

ENVIRONMENT: Depressions or swamps with shallow sands overlying a clay base. Median annual rainfall is between 700 and 900 mm.

ALTITUDE: Mean = 40 m, Highest = 90 m, Lowest = 10 m.

STRUCTURE: Closed-heath

MEAN FLORISTIC RICHNESS: 23 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: This sub-community shares a large proportion of its species and genera with EG Community 17, sub-community 2 (Forbes *et al.* 1982) which is widely known as "grass-tree plain". On French Island the "grass-tree" *(Xanthorrhoea minor)* does not dominate the sub-community as it does in East Gippsland.

The vegetation of WPC 15.4 ranges from 10 to 30 years old and is older than that in the other sub-communities of WPC Community 15. Some noteable specimens of *Casuarina pusilla* and *Casuarina paludosa* in this coastal heathland were greater than 3 metres tall.

COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.5

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Gonocarpus teucrioides	100	1	Bauera rubioides	65	2	Lindsaea linearis	57	1
Leptospermum juniperinum	100	2	Platylobium obtusangulum	57	1	Lepidosperma filiforme	52	2
Gahnia radula	83	2	Banksia marginata	57	+			
Casuarina paludosa	78	1	Epacris impressa	57	+			

NO. OF SITES: 23 (2.3% of total)

DISTRIBUTION: Concentrated in the north-central region of French Island with a few sites in the north-east.

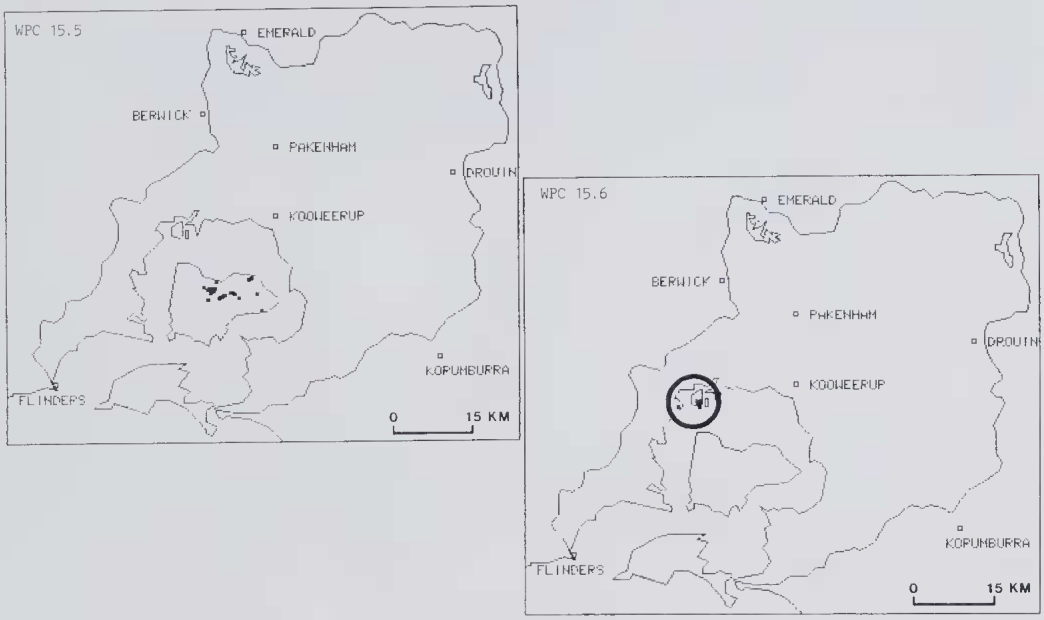
ENVIRONMENT: Depressions or swamps with shallow sands overlying a clay base. Median annual rainfall is between 700 and 900 mm.

ALTITUDE: Mean = 53 m, Highest = 95 m, Lowest = 0 m.

STRUCTURE: Low woodland to Closed-heath

MEAN FLORISTIC RICHNESS: 20 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: Depauperate form of coastal heathland vegetation dominated by the shrub *Casuarina paludosa*.



COASTAL HEATHLAND : SUB-COMMUNITY WPC 15.6

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leptospermum juniperinum	100	3	Drosera whittakeri	79	1	Hibbertia acicularis	71	1
Banksia marginata	86	1	Epacris impressa	79	1	Lepidosperma neesii	57	3
Gonocarpus tetragynus	86	1	Isopogon ceratophyllus	79	1	Pimelea humilis	57	+
Hibbertia stricta	79	1	Casuarina paludosa	71	1	Xanthorrhoea minor	57	1

NO. OF SITES: 14 (1.4% of total)

DISTRIBUTION: Restricted to Quail Island and two sites near Yaringa.

ENVIRONMENT: Poorly drained near-coastal fresh water swamps on sandy clays. Median annual rainfall is between 700 and 800 mm.

ALTITUDE: Mean = 5 m, Highest = 10 m, Lowest = 5 m.

STRUCTURE: Closed-heath

MEAN FLORISTIC RICHNESS: 22 species per site. MEAN WEED COMPOSITION: No weeds.

NOTES: WPC 15.6 is dominated by low sclerophyllous shrubs and sedges. It is one of two sub-communities within the catchment in which *Lepidosperma neesii* is a character species (the other being WPC 15.2). This sedge is more commonly a component of East Gippsland coastal heaths.

PRIMARY DUNE SCRUB : SUB-COMMUNITY WPC 16.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
*Ammophila arenaria	100	1	Spinifex hirsutus	67	1	*Polycarpon tetraphyllum	67	+
Daucus glochidiatus	100	+	Calocephalus brownii	67	1	Senecio lautus	67	1
Helichrysum paralium	100	1	Cardamine debilis	67	1	Swainsonia lessertiifolia	67	1
Olearia axillaris	100	2	Crassula macrantha	67	+	Tetragonia implexicoma	67	2
Rhagodia baccata	100	1	Crassula sieberiana	67	+	Caryophyllaceae spp.	67	1
Scirpus nodosus	100	1	Dianella revoluta	67	1	Compositae spp.	67	+
Senecio spp.	100	+	*Hypochoeris radicata	67	+			
Leucopogon parviflorus	67	+	Poa poiformis	67	1			

NO. OF SITES: 3 (0.3% of sites)

DISTRIBUTION: Restricted to the south-east coast of Phillip Island. Also occurs at Sandy Point on the mainland (Robin and Parsons 1976).

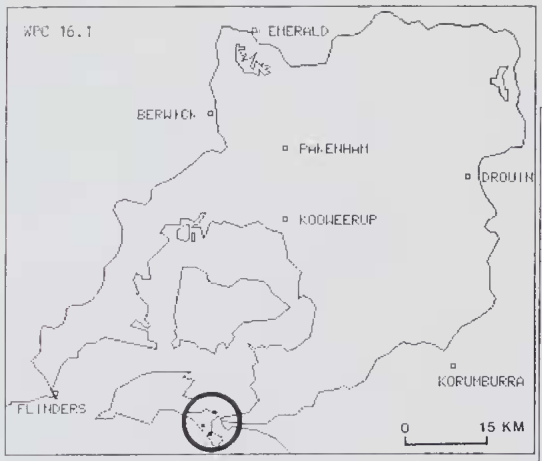
ENVIRONMENT: Exposed embryonic to tertiary sand dunes. Median annual rainfall is 700-800 mm.

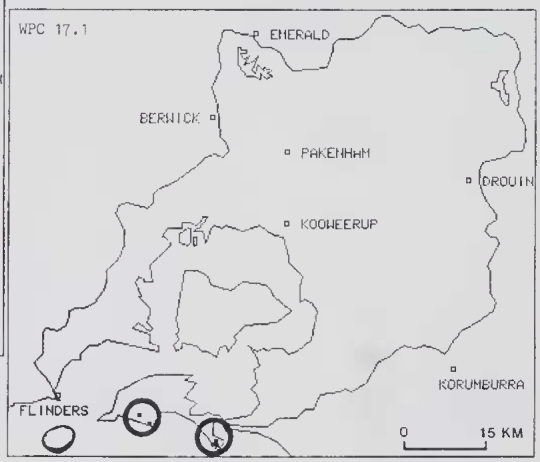
ALTITUDE: Mean = 16 m, Highest = 25 m, Lowest = 3 m.

STRUCTURE: Open-heath

MEAN FLORISTIC RICHNESS: 23 species per site. MEAN WEED COMPOSITION: 19% of species, 19% of cover.

NOTES: The rhizomatous growth habit of some, and extensive root system of most, of the species of this sub-community contribute to the important function of dune stabilization. Protection from strong salt winds afforded by the foredunes is essential for the maintenance of communities further inland. The delicate balance between sand-binding plants and soil structure is, however, readily upset by trampling and this may explain the restricted distribution of this vegetation type - which is otherwise well represented along Victoria's coastline - within the catchment (e.g. GLC 13.1 and EG 20.1 in Forbes et *al.* 1981). A common feature of this vegetation type is the replacement of the native sand-binding grass *Spinifex hirsutus* with plantations of the introduced grass *Ammophila arenaria*.





COASTAL TUSSOCK GRASSLAND : SUB-COMMUNITY WPC 17.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Acaena anserinifolia	100	1	*Sonchus oleraceus	60	+	Senecio lautus	60	1
Poa poiformis	100	3	Calocephalus brownii	60	1	Tetragonia implexicoma	60	1
Scirpus nodosus	100	1	Dichondra repens	60	+	Geranium spp.	60	+
*Holcus lanatus	80	+	*Hypochoeris radicata	60	1			
Dianella revoluta	80	1	Oxalis corniculata	60	1			

NO. OF SITES: 5 (0.5% of total)

DISTRIBUTION: Restricted to the south coast of Phillip Island.

ENVIRONMENT: Coastal cliff areas exposed to intense winds and sea spray, and subject to limiting soil conditions such as a sparse horizon and low organic matter content. Median annual rainfall is 700-800 mm.

ALTITUDE: Mean = 31 m, Highest = 60 m, Lowest = 3 m.

STRUCTURE: Open tussock grassland

MEAN FLORISTIC RICHNESS: 25 species per site. MEAN WEED COMPOSITION: 13% of species, 9% of cover.

NOTES: A sub-community containing grasses, sedges, herbs and, in areas where soil conditions permit, wind-pruned shrubs, which are adapted to the extreme environment of an exposed coast. The shallow, gravelly soil which supports WPC 16.1 is easily disturbed and trampling can have a drastic effect on the vegetation. It is the only sub-community in the Study Area which is dominated by *Poa poiformis*, a tussock grass which is common on undisturbed Victorian coasts and islands of Bass Strait. One site contains the rare species *Cyathodes juniperinum*.

COASTAL TEA-TREE SCRUB : SUB-COMMUNITY WPC 18.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leptospermum laevigatum	100	3	Lophocolea semiteres	59	1	Senecio lautus	50	1
Leucopogon parviflorus	86	2	Dichondra repens	59	1	Scirpus nodosus	50	1
Clematis microphylla	73	1	Rhagodia baccata	55	1	Daucus glochidiatus	50	1

NO. OF SITES: 22 (2.2% of total)

DISTRIBUTION: Widespread along the coast of Phillip Island and along the south-west coast of the mainland between Sandy Point and Flinders, and at Sandy Point on French Island.

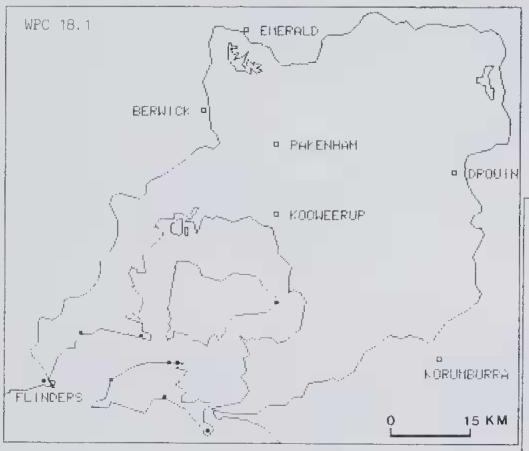
ENVIRONMENT: Calcareous sands in coastal areas which are generally less exposed, and have undergone greater substrate development than sites supporting WPC 16.1 and WPC 17.1. Median annual rainfall is 700-1000 mm.

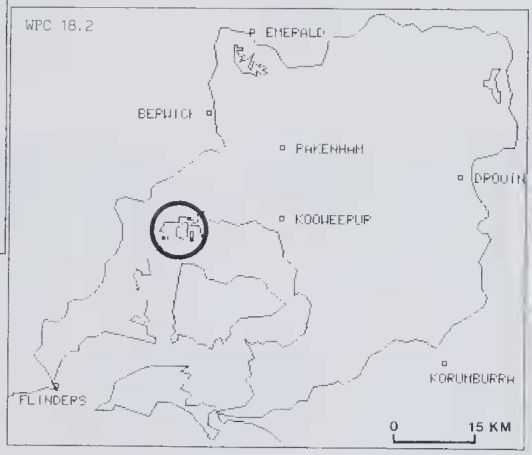
ALTITUDE: Mean = 19 m, Highest = 100 m, Lowest = sea level.

STRUCTURE: Open-scrub

MEAN FLORISTIC RICHNESS: 18 species per site. MEAN WEED COMPOSITION: 11% of species, 8% of cover.

NOTES: This is the best known coastal vegetation near Melbourne - the tea-tree vegetation. In many places *Leptospermum laevigatum* forms such a dense canopy that few other species grow beneath it. In other places the large shrubs *Leucopogon parviflorus* and *Banksia integrifolia* are also present and break up the canopy to increase the growth of understorey species. Many, if not most, sites supporting this sub-community were exploited by settlers for firewood in the early part of the century.





COASTAL TEA-TREE SCRUB : SUB-COMMUNITY WPC 18.2

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Eucalyptus viminalis	100	+	*Hypochoeris radicata	67	+	*Stellaria media	67	1
Leptospermum laevigatum	100	4	Lagenifera stipitata	67	1	Pterostylis longifolia	67	1

NO. OF SITES: 3 (0.3% of total)

DISTRIBUTION: Three isolated occurrences at Yaringa, Cannons Creek and Chinaman Island.

ENVIRONMENT: Flat areas near the coast on deep siliceous sands. Median annual rainfall is between 700 and 800 mm.

ALTITUDE: Mean = 4 m, Highest = 5 m, Lowest = 2 m.

STRUCTURE: Closed-forest

MEAN FLORISTIC RICHNESS: 14 species per site. MEAN WEED COMPOSITION: 13% of species, 7% of cover.

NOTES: An unusual vegetation type of very tall (± 10 m) *Leptospermum laevigatum* in which the scrub layer is absent, and the ground layer is sparse.

These stands are very old and may pre-date European settlement. However, they may have originally contained *Casuarina stricta* and *Banksia integrifolia* which were subsequently removed by the early settlers.

The Chinaman Island site is slightly different from the other two in that *L. laevigatum* is co-dominant with large *Melaleuca ericifolia*.

COASTAL Banksia WOODLAND : SUB-COMMUNITY WPC 19.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Leucopogon parviflorus	100	2	Pteridium esculentum	83	3	Clematis microphylla	67	+
Banksia integrifolia	83	1	Eucalyptus viminalis	67	2			

NO. OF SITES: 6 (0.6% of total)

DISTRIBUTION: Restricted to the south-west coast between Sandy Point and Flinders.

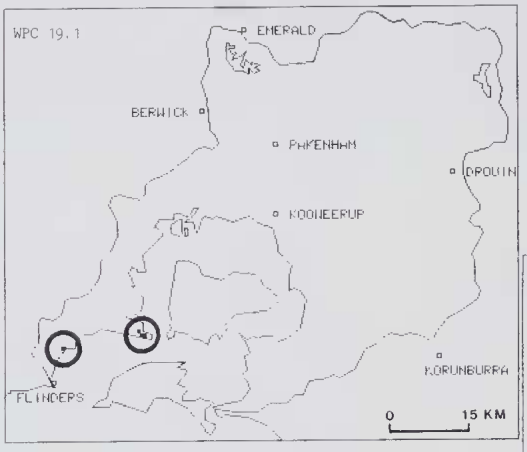
ENVIRONMENT: Calcareous sands in coastal areas which are generally less exposed, and have undergone greater substrate development than sites supporting WPC 16, WPC 17 and WPC 18. Median annual rainfall is 700-800 mm.

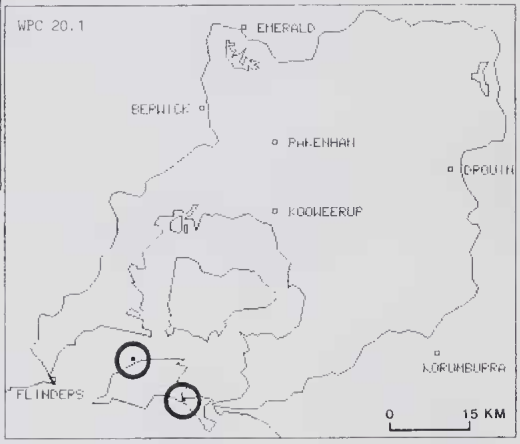
ALTITUDE: Mean = 13 m, Highest = 30 m, Lowest = 5 m.

STRUCTURE: Low-open forest

MEAN FLORISTIC RICHNESS: 17 species per site. MEAN WEED COMPOSITION: 9% of species, 6% of cover.

NOTES: WPC 19.1, which is dominated by *Eucalyptus viminalis*, generally occurs landward of the closely associated WPC 18.1. The understorey species and floristic diversity varies markedly within this sub-community. The high incidence of *Pteridium esculentum* is indicative of frequent burning.
WPC 19.1 has affinities with GLC 12 (Gullan *et al.* 1981) and EG 19 (Forbes *et al.* 1982).





SUB-COMMUNITY WPC 20.1

CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A	CHARACTER SPECIES	% FREQ	C/A
Clematis microphylla	100	+	Melaleuca lanceolata	100	3	*Stellaria media	100	1
*Ehrharta longiflora	100	2	Parietaria debilis	100	1	Tetragonia implexicoma	100	1
Leptospermum laevigatum	100	1	Rhagodia baccata	100	1			
Leucopogon parviflorus	100	1	*Sonchus oleraceus	100	1			

NO. OF SITES: 2 (0.2% of total)

DISTRIBUTION: Few isolated occurrences on Phillip Island.

ENVIRONMENT: In sheltered areas on tuff cliffs or calcareous sand dunes in close proximity to volcanic tuffs or basaltic soils. Median annual rainfall 700-800 mm.

ALTITUDE: Mean = 12 m, Highest = 20 m, Lowest = 5 m.

STRUCTURE: Low-open forest

MEAN FLORISTIC RICHNESS: 21 species per site. MEAN WEED COMPOSITION: 35% of species, 41% of cover.

NOTES: This sub-community is characterised by *Melaleuca lanceolata*, a species of disjunct and limited distribution within the State. However, the pleasant appearance of these trees and the shade afforded by their canopy has led to the severe trampling of many sites by tourists and consequent weed invasion.